ARCHITECTURE DEPARTMENT **CHINESE UNIVERSITY OF HONG KONG**

MASTER OF ARCHITECTURE PROGRAMME 2002-2003 DESIGN REPORT

FLYOVER AND URBANISM - REWEAVING THE NEW & OLD URBAN FABRICS

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Content:

I. Introduction

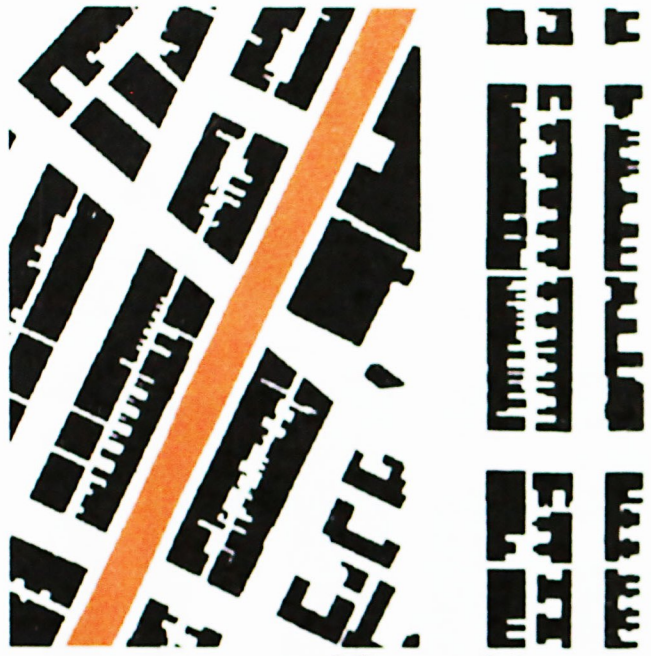
Introduction

Hong Kong is inarguably a dense city, according the government statistics in 2000, there are over 580000 vehicles in Hong Kong. Traffic on streets is often busy.
Since the 1960s, a lot of flyovers have been built to provide a fast and direct linkage from one place to another. According to statistics from Highways Department, there are a total of 905 flyovers in Hong Kong, among them 173 are in Hong Kong Island, 142 in Kowloon and 590 in the New Territories.
But, the flyovers and the city fabric are considered two independent systems. Flyovers were located and designed according to the functional needs for vehicular communication and other technical considerations. Their relationship with the urban fabric and the impact to the districts they cut through were seldom considered. As a result, the situation in the districts where flyovers run through can be undesirable. Some flyovers, which were built on narrow streets with buildings closely on two sides, have been causing poor physiological conditions to the districts. Some have become a barrier cutting a district into halves. Some have occupied certain advantageous locations in the city, and prevented developments, which potentially can be more beneficial to the city, from being built there.

Thesis Statement:
To tackle the problems concerned with flyovers in the city, one can immediately think of two major directions. One is to relocate the flyovers, the other is to keep the flyovers but deal with the areas and buildings surround them.
The first direction includes relocation of flyovers, or putting them underground. One example is the "Big Dig" project being carried out in Boston, where an elevated interstate through the city centre is being put underground. However, the cost can be huge, as it involves re-planning of the traffic system, extensive excavation, and redirection of underground services. It can hardly be considered as feasible, in a lot of situation in Hong Kong.
The second direction sees the flyovers as fixed elements and involves redesigning of the areas and buildings next to the flyovers. Compared with the first direction, we believe this is a more pursuable approach.
So, this thesis will explore how the design of an area or buildings can relate to the flyovers cutting through or next to them, so that a new relationship between the urban environment and flyovers is built up. In this relationship, the presence of the flyovers is acknowledged in the form and design of the surrounding urban fabric or buildings. In some cases, the flyovers can bear an additional positive role in the constitution of the city, in addition to merely a structure for vehicular communication, they can become "places", "connectors", "landmarks" etc.

Method of Inquiry:
There is a large no. of flyovers in Hong Kong, their difference in physical forms and locations give rise to a wide range of conditions. And the issues associated with flyovers with different conditions can be different. As a result, it is necessary to look at a number of existing cases to have a full picture of the issues with flyovers.
In the process of looking at different cases, we found that the issues with a flyover are often governed by the physical relationship between the flyover and districts' fabric where it locates. So, we then classify cases into types according to the physical relationship between the flyovers and the districts' fabric, so as to identify the general issues for each typical condition. There are variations within a type and among them the issues may be slightly different, this will be discussed later in further analysis.

II. Research – Flyover and Urbanism



1. Typology Definition

Typology Definition

Type 1 - Living with Flyover

Definition: Flyover along a road with developments immediately on the two sides of the road.

This type is normally found within the gridiron plan in the older part of the city. There is a wide range of variables within this type, for example: the width and height of the flyover; the width of the street, the distance between the flyover and buildings; the number of vehicular lanes on ground below the flyover; setback of buildings on two sides; façades of buildings on two sides etc.
These variables determine the seriousness of certain issues in different cases, they also determine any possible usage of the spaces under the flyover.
Present usage includes market, park and sitting out area, bus stop, community centre etc. But the majority of them are left unused, and many are occupied by homeless.

Existing Issues:

Physiological issues-
a. Air pollution
b. Noise pollution
c. Visual pollution
d. Poor illumination to spaces under the flyover

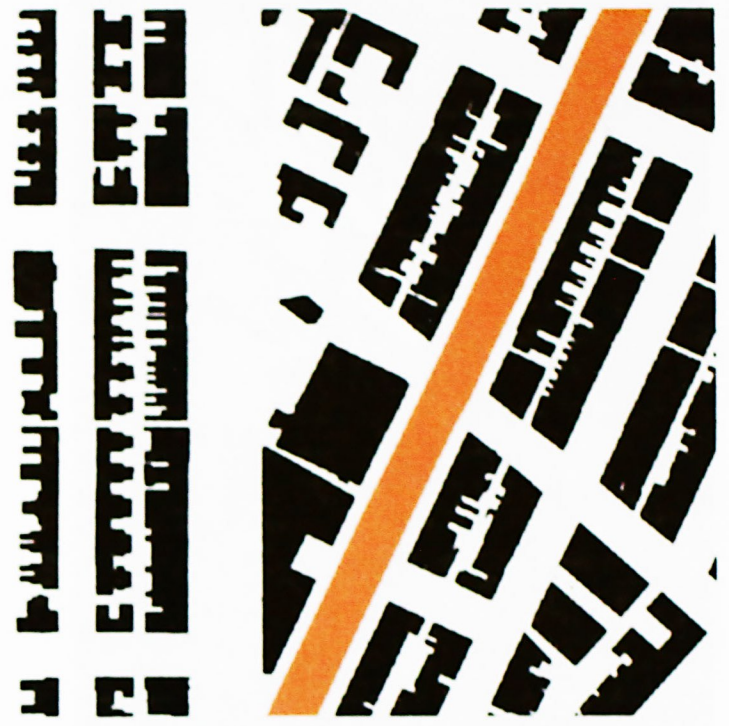
Issues for further studies:

1. Form and facades of the buildings on the two sides
- Close relationship between people in the buildings and fast moving vehicles
- Mitigating treatment on the poor physiological condition

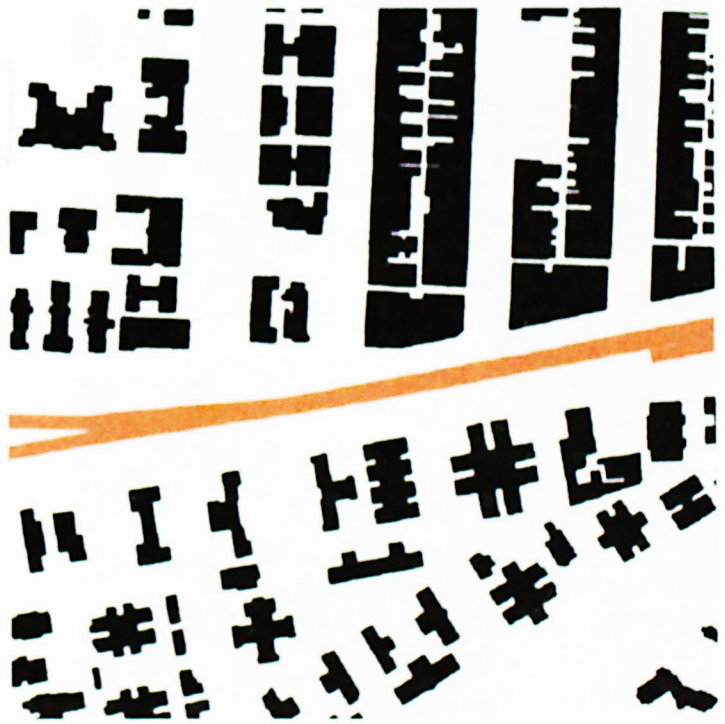
2. Permeability
- Circulation pattern of pedestrian around the flyover
- Means of crossing: below/ground/above; free/restricted

3. Possible uses and developments in the space above and underneath

MA TAU WAI - EAST KOWLOON CORRIDOR

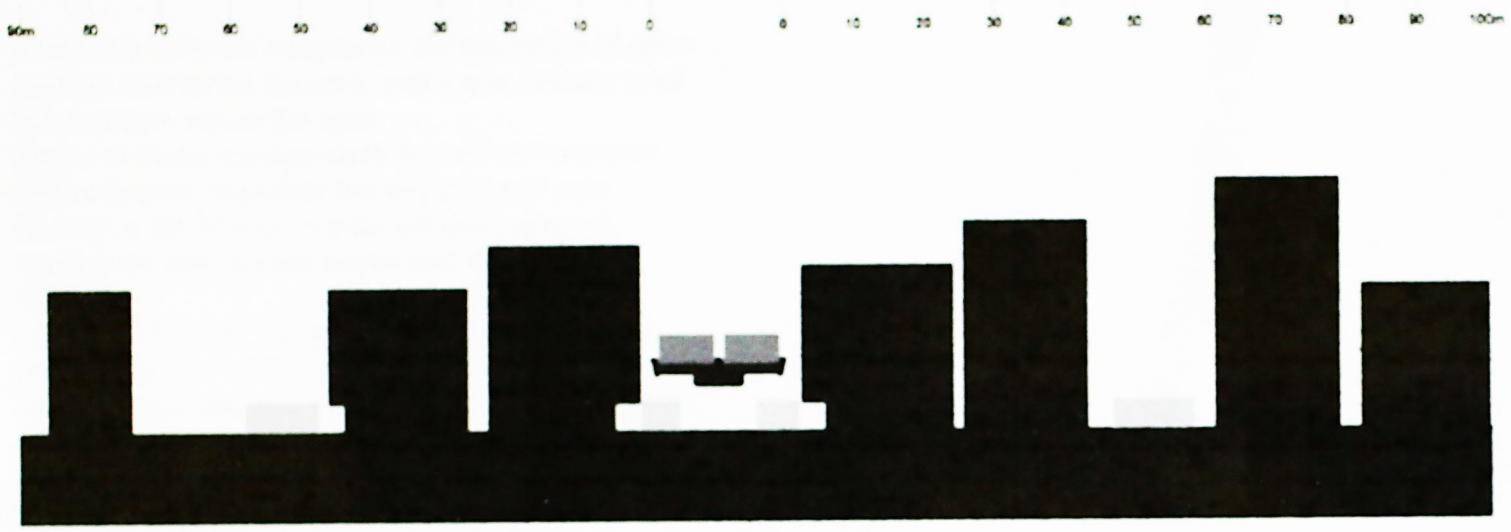


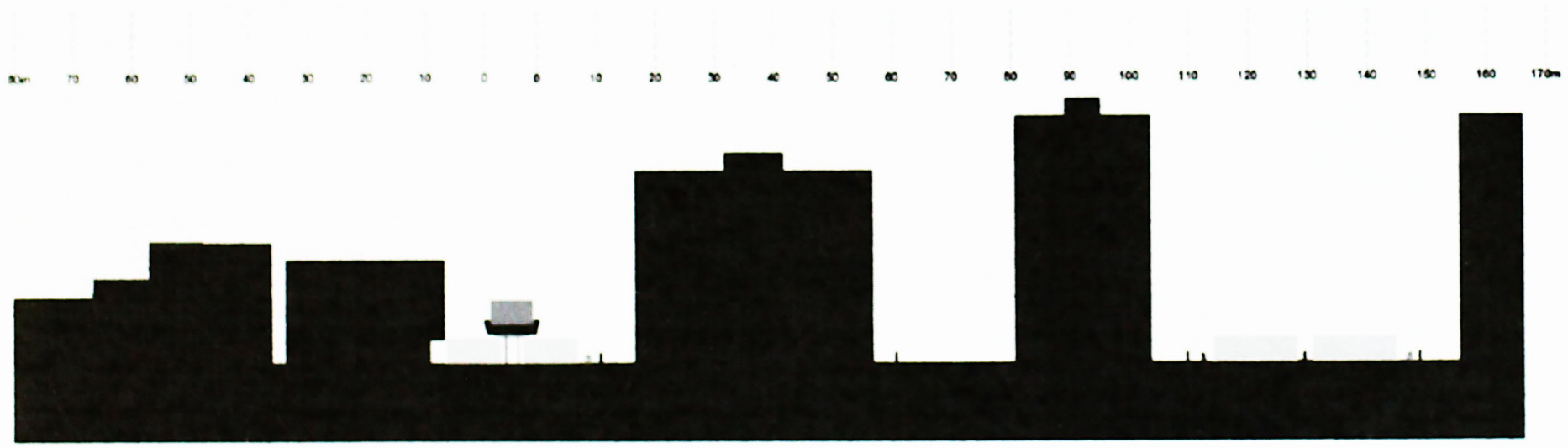
KOWLOON CITY - PRINCE EDWARD ROAD W. FLYOVER



Typology Definition

Type 1 - Living with Flyover





Typology Definition

Type 2 - Flyover and Open Space

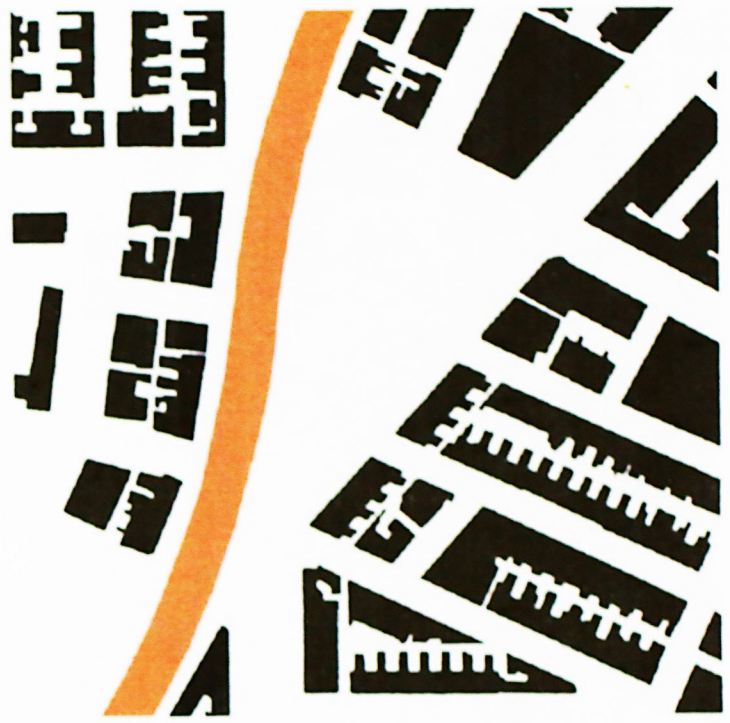
Definition: Flyover within the gridiron urban fabric with an open space on one or both sides in front of the closest city block

There are different causes for the formation of open spaces next to the flyovers, and these causes lead to variations within the type.
Some of those spaces were formed at the points where flyover intersects the city grid and cuts through a lot. The lot is then left undeveloped, leaving an open space below and besides the flyover.
Example: Yau Ma Tei – Gascoigne Road Flyover
Some of them happen at places where the flyover turns, an odd-shaped space is formed between the orthogonal city blocks and curvilinear turning flyover. Those spaces can hardly be developed, and were therefore left opened.
Example: Shau Kei Wan – Eastern Corridor)
However, the majority of them were not directly caused by the flyover, but by the angular intersections between streets. Some odd-shaped spaces are resulted and left opened. As there is flyover built upon one of them, the condition for type 2 is resulted
Example: Ma Tau Wai – East Kowloon Corridor)
Regardless of the causes for the space, their shapes are often odd, and they are often rare in a densely packed area. Most of the spaces are used as parks or sitting out area. Some were built over with one-storey structure serving generally as market. For some of them, the flyover has become a shelter for those spaces.

Issues for further studies

1. Formal relationship between orthogonal city grid, "organic" flyovers, buildings and open spaces. How they work together to form an urban public space.
- How the flyovers affect the city fabric
- The role of flyover in the odd shaped space
- Usage of the odd shaped space

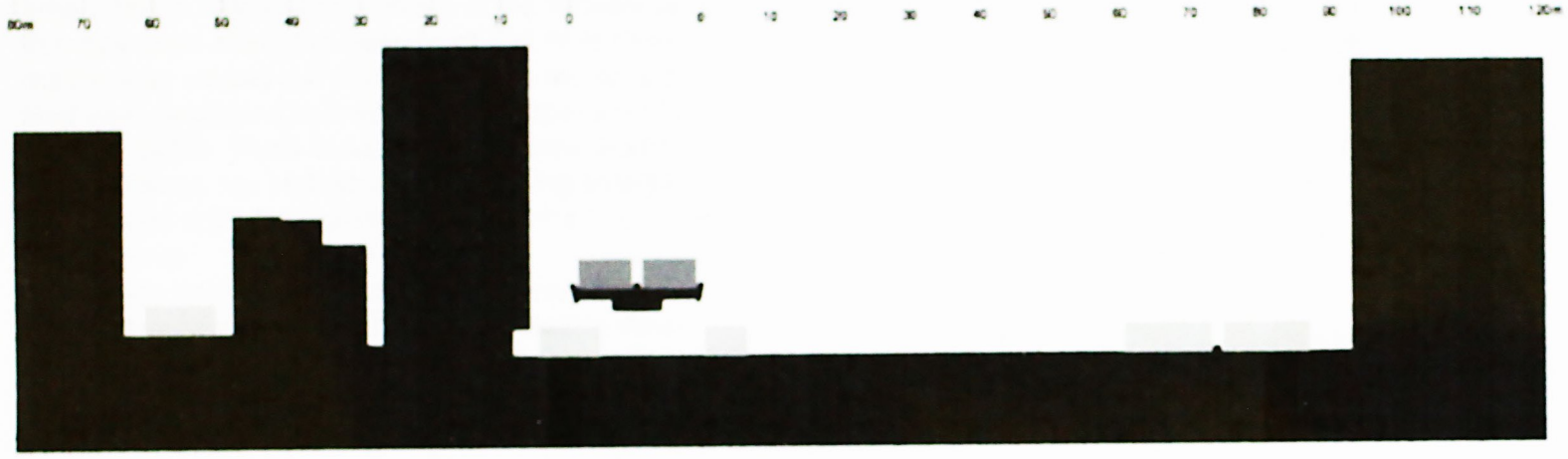
MA TAU WAI - EAST KOWLOON CORRIDOR

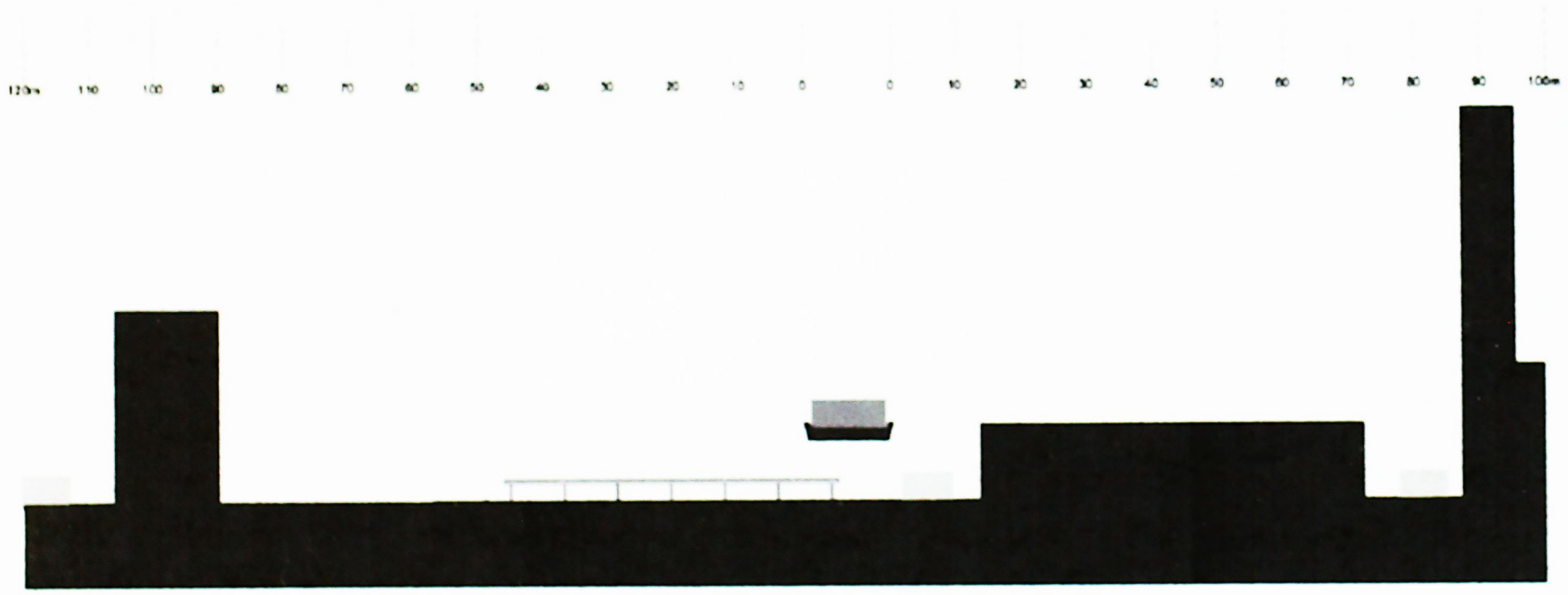


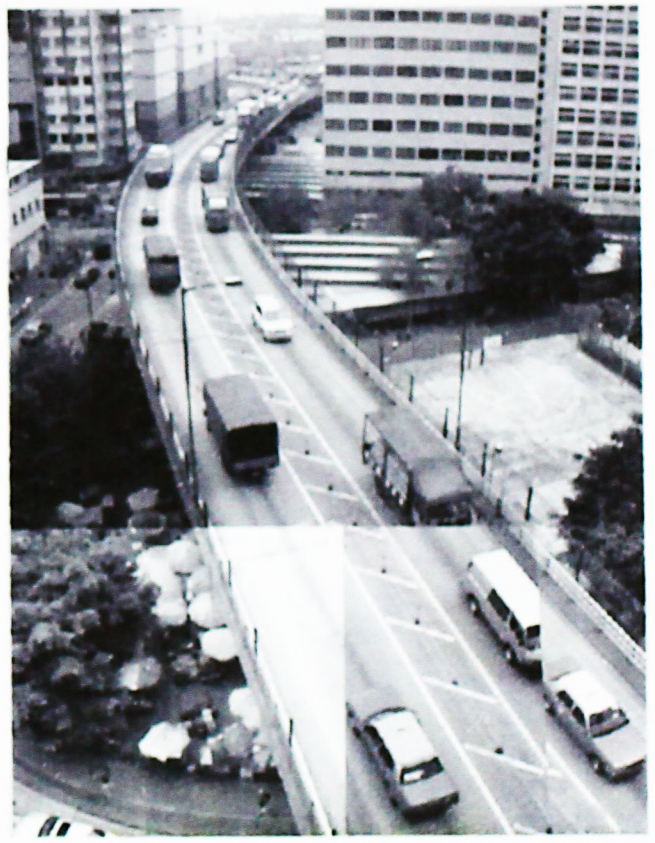
YAU MA TEI - GASCOIGNE ROAD FLYOVER

Typology Definition

Type 2 - Flyover and Open Space







Typology Definition

Type 3 - Flyover as Transition

Definition: Flyover between two areas developed with contrasting planning principles.

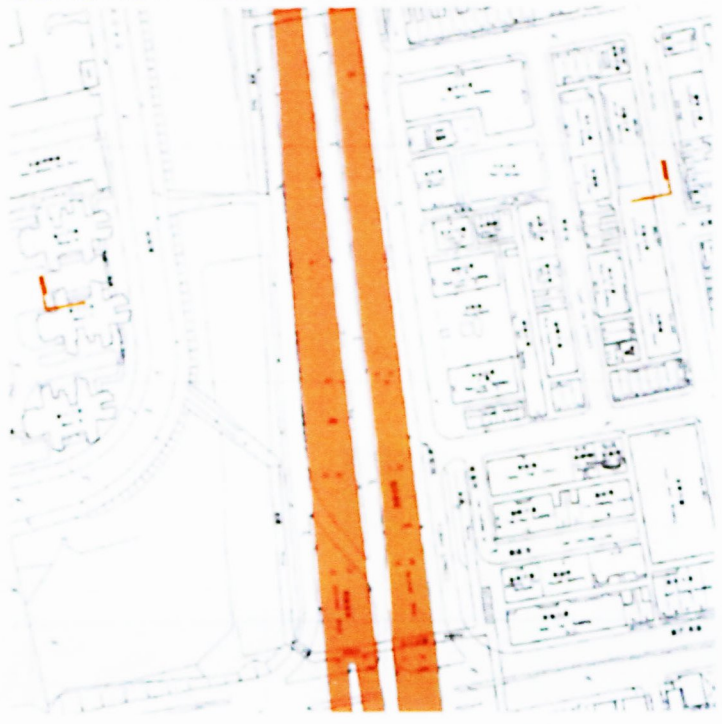
Most of the flyovers in this type are situated between an old area with a gridiron urban fabric and a new area without. Years before, many of the flyovers of this type were along the waterfront. But after reclamation was carried out along them, the reclaimed land was developed in a way different from the old districts' fabric. There is no grid on the new areas, many of those are pedestrianized housing estates. This results in the contrasting fabric on the two sides of the flyover.
The flyover has become read as a physical and visual boundary between the two contrasting areas. Some has got a few vehicular lanes on ground making it even impermeable, and has to be crossed with pedestrian bridge. Nevertheless, it is a boundary through which thousands of people have to cross everyday.

Issues for further studies:

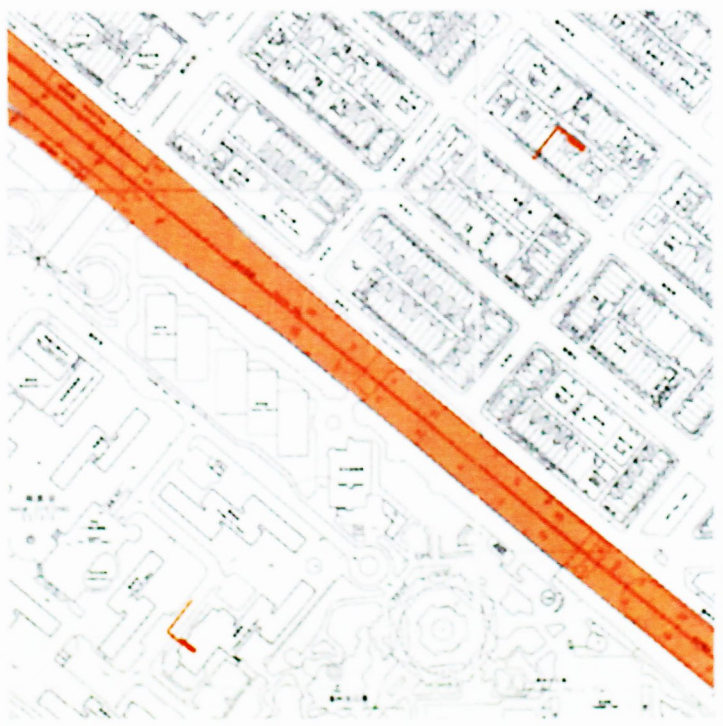
1. Connectivity
- The flyover, being an object between the two contrasting areas, has potential to be converted into a transitional zone.
- Experience in the two contrasting districts, and what will be a suitable transition between the two

2. Permeability
- Circulation pattern of pedestrian around the flyover
- Means of crossing: below/ground/above; free/restricted

MONG KOK - WEST KOWLOON CORRIDOR

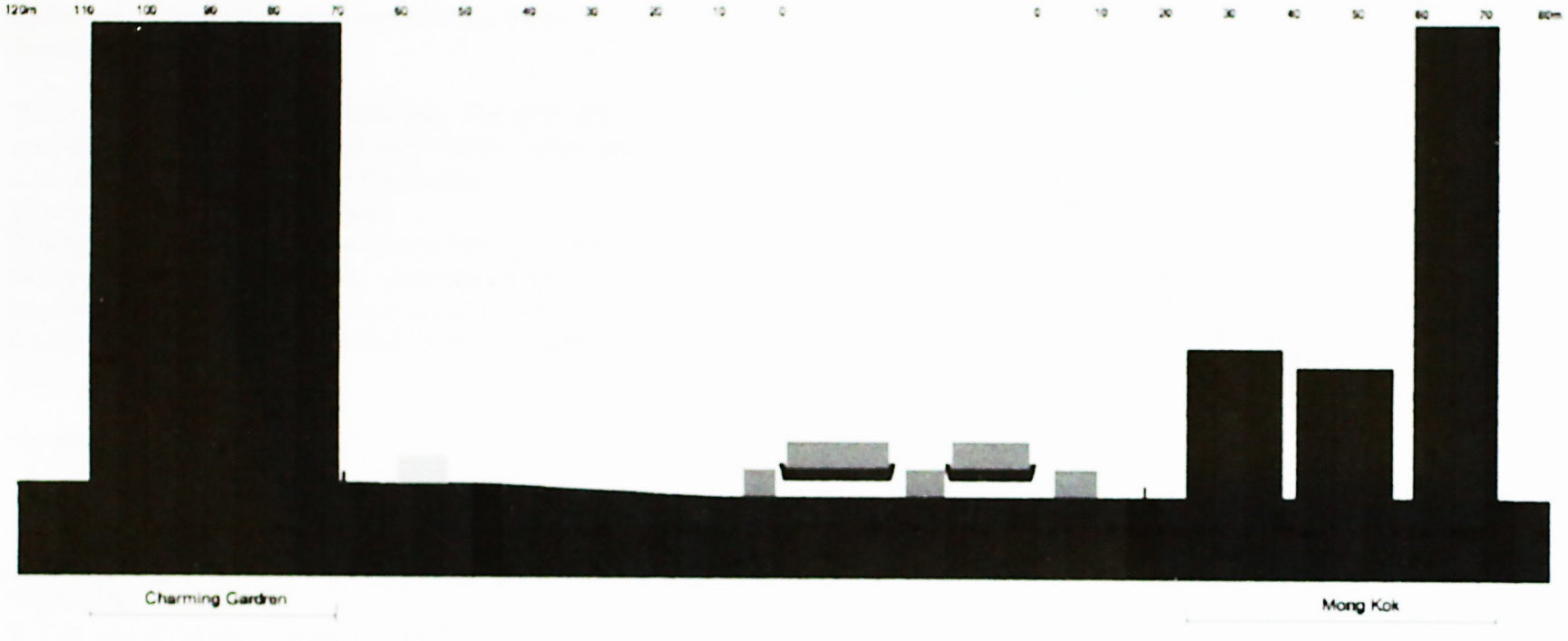


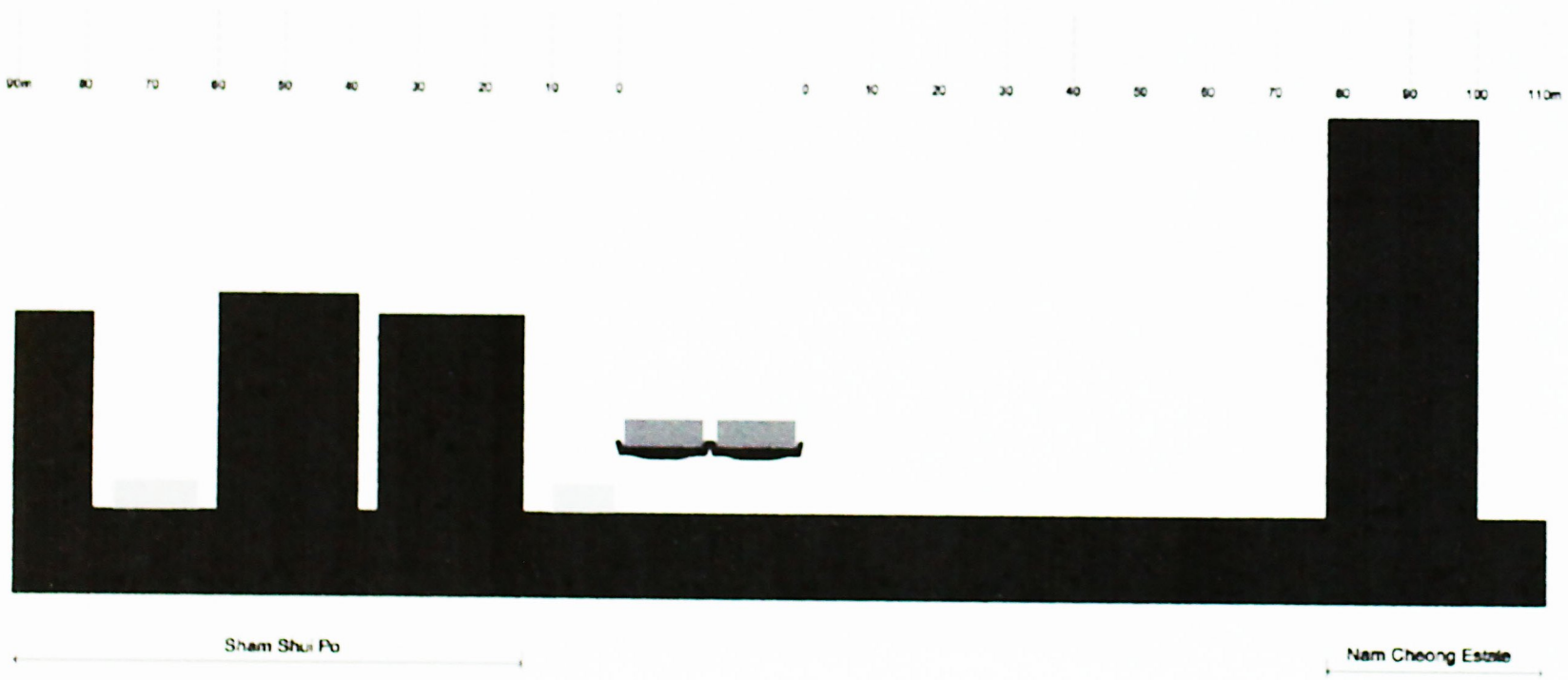
SHAM SHUI PO - WEST KOWLOON CORRIDOR



Typology Definition

Type 3 - Flyover as Transition





Type 4 - Flyover as Generator

Definition: Flyover through areas with no urban development on both sides

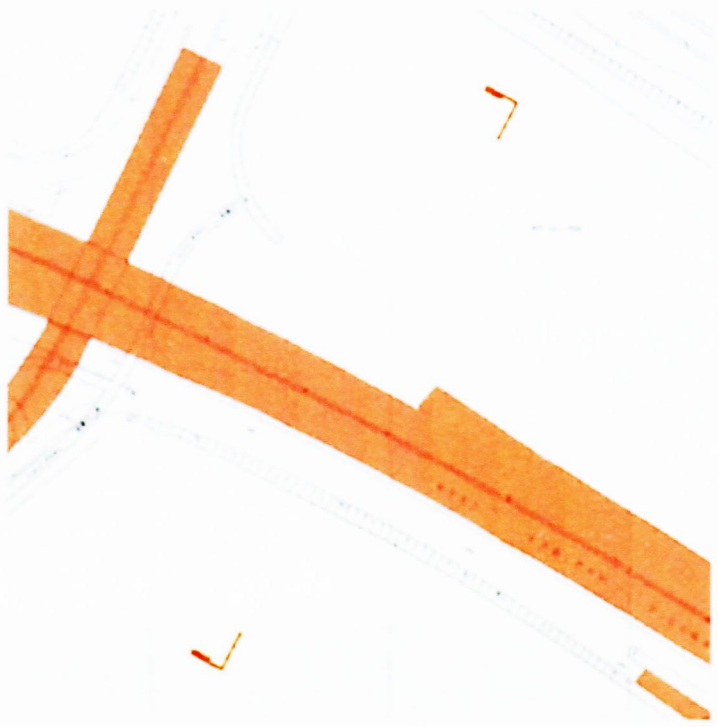
There are two categories in this type. The first category includes flyovers through rural areas. There are a lot of examples in the New Territories.
Example: Tai Po – Tolo Highway
The second category include flyover through some newly reclaimed land or other areas that is going to be developed, but is still left opened at present.
Example: West Kowloon – West Kowloon Expressway

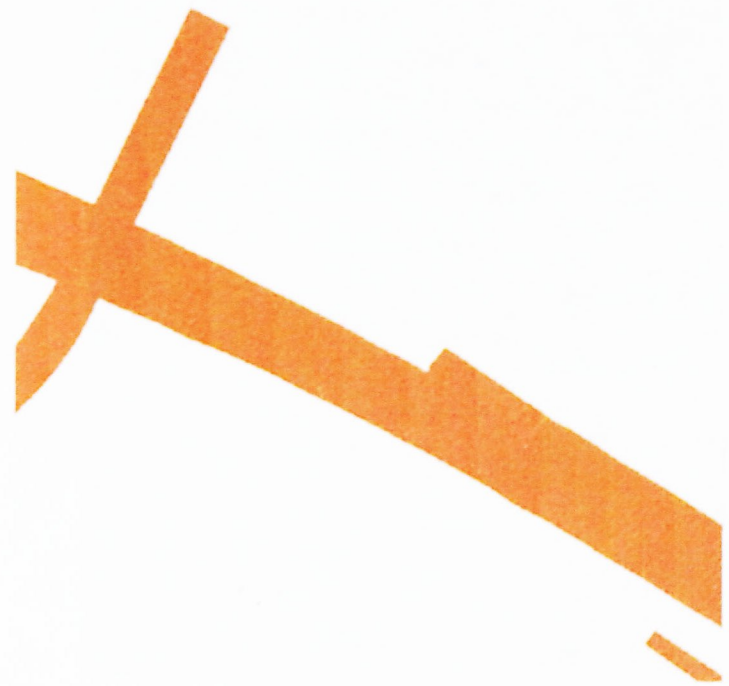
Issues for further studies:

1. The demonstration of the way to consider flyover and other developments together in the process of planning, to prevent any undesirable condition from happening.
2. The role of flyover in constituting the urban environment, in addition to merely serving vehicular communication.
- Trigger urbanization on the land on the two sides of flyover or;
- "Urbanized" the flyover, leaving the two sides as open spaces etc.

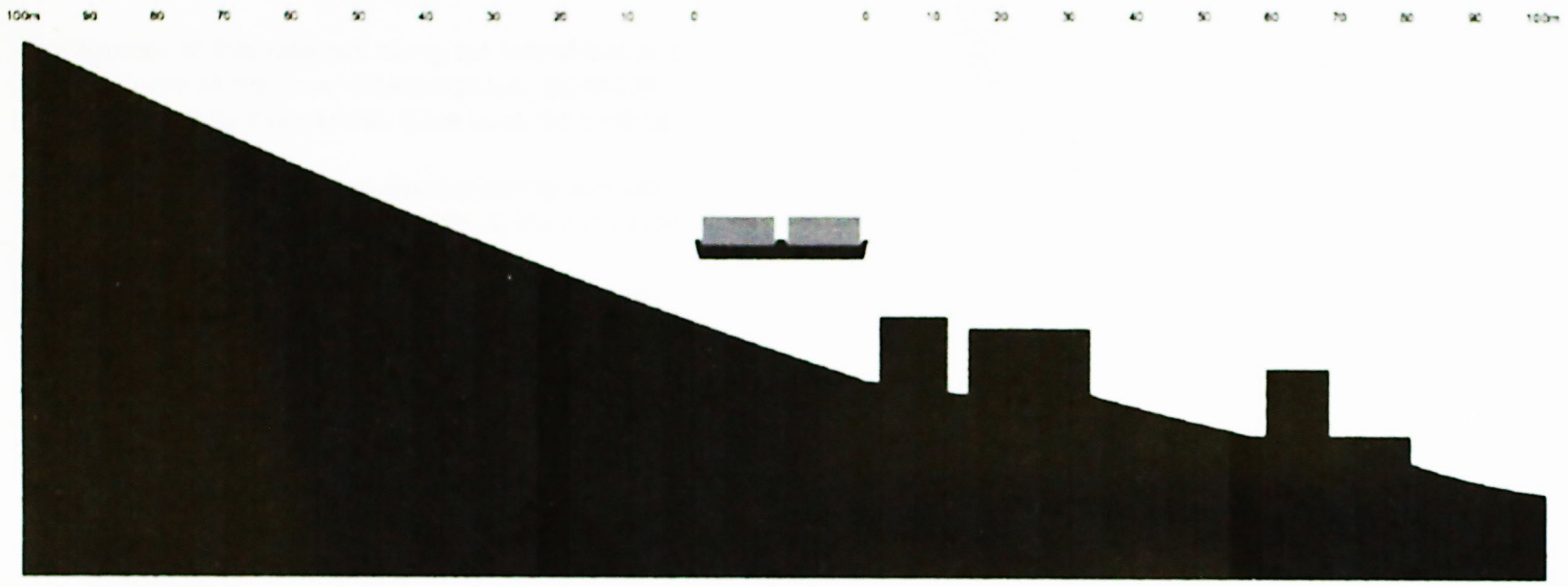
TAI PO - TOLO HIGHWAY

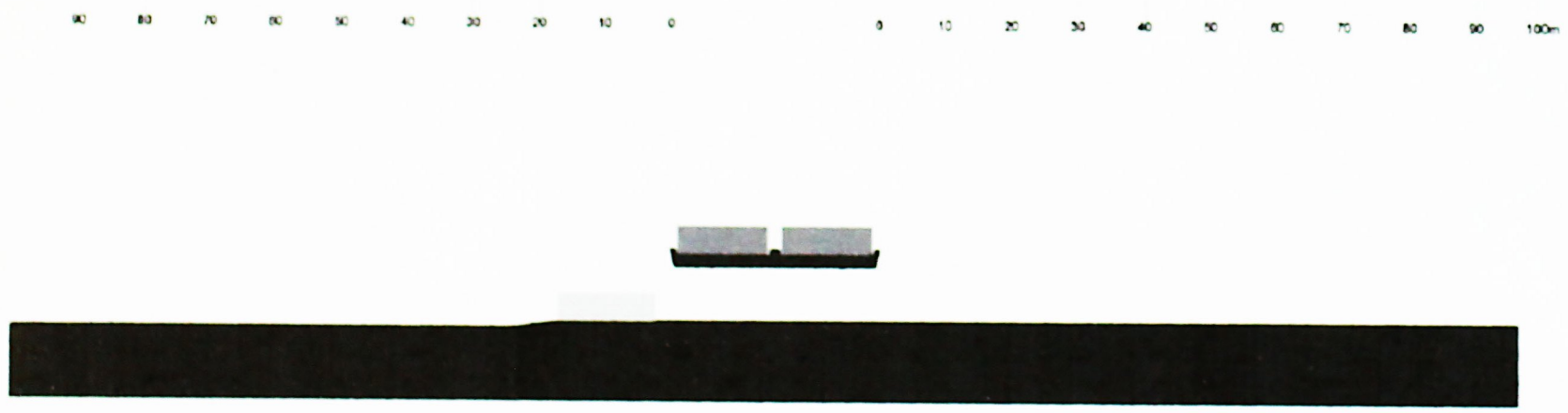
WEST KOWLOON - WEST KOWLOON EXPRESSWAY

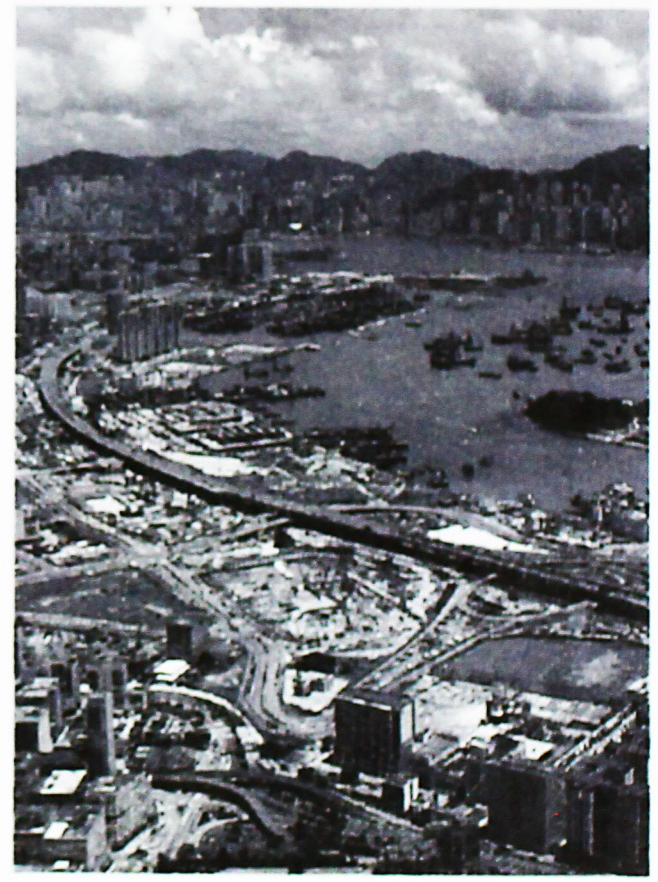




Type 4 - Flyover as Generator







Type 5 - Flyover and Water

Definition: Flyover between land and water

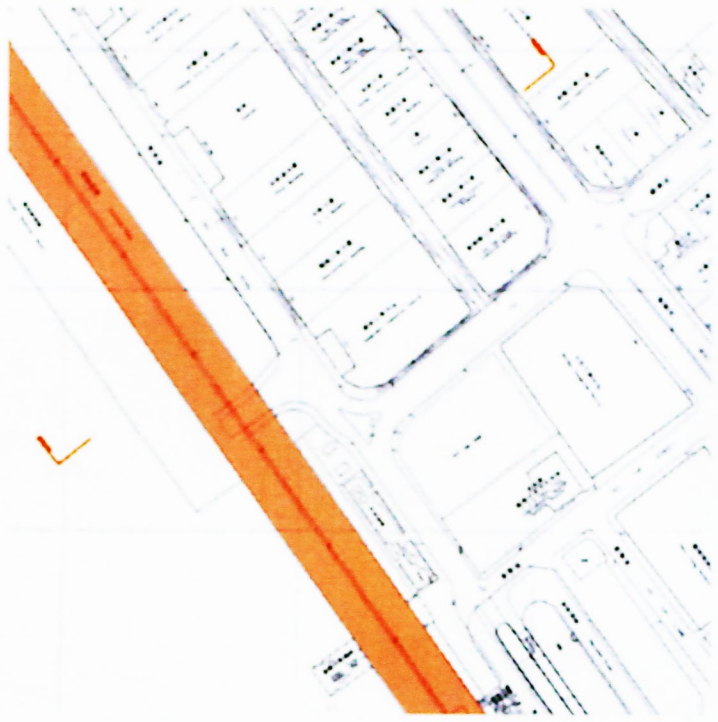
The flyovers of this type run along the waterfront and occupy some of the most advantageous spaces in the city. And they themselves have become a visual barrier to the water.
For some of them, there are developments immediately on the land side, for some others the land side is presently left opened.
If reclamation is going to happen along the flyover, and the newly reclaimed land is to be developed in a contrasting manner with the other side, the portion of flyover will become type 3.

Issues for further studies:

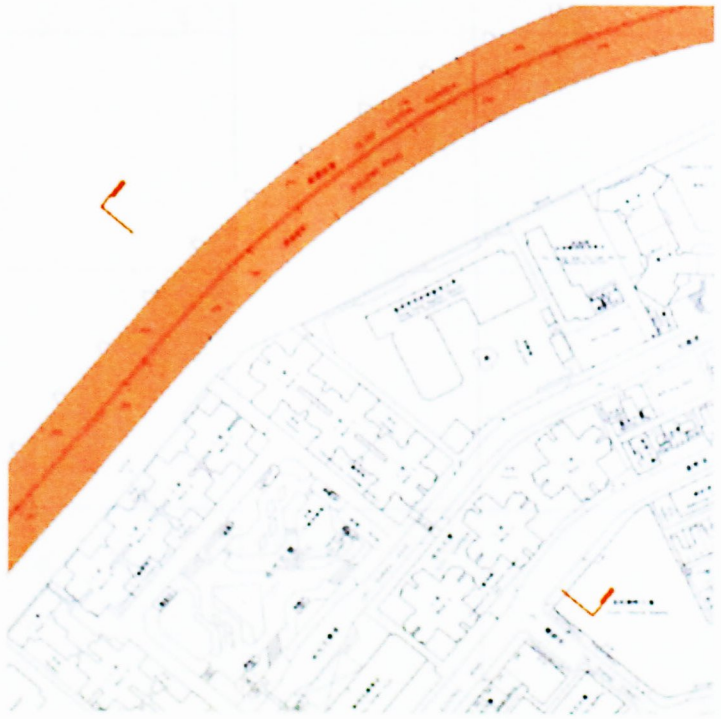
1. Relationship between the flyover, development, water and land

2. Balancing the interests of different parties
Flyovers of this type occupy some of the most advantageous spaces in the city, the spaces are valuable, it can be imagined that the developments on them will be profitable. So it involves the question of how and for whom the spaces are developed.
- balance between private and public parties; whether the public can have access to the waterfront
- balance between private parties; whether the future development will block those existing behind.

KWUN TONG - KWUN TONG BYPASS

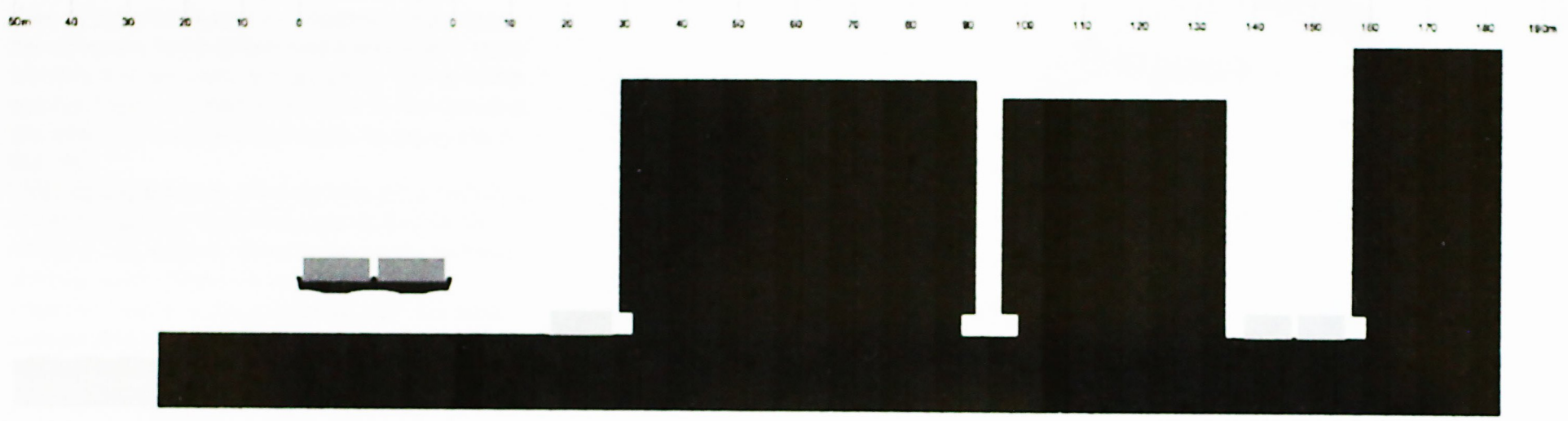


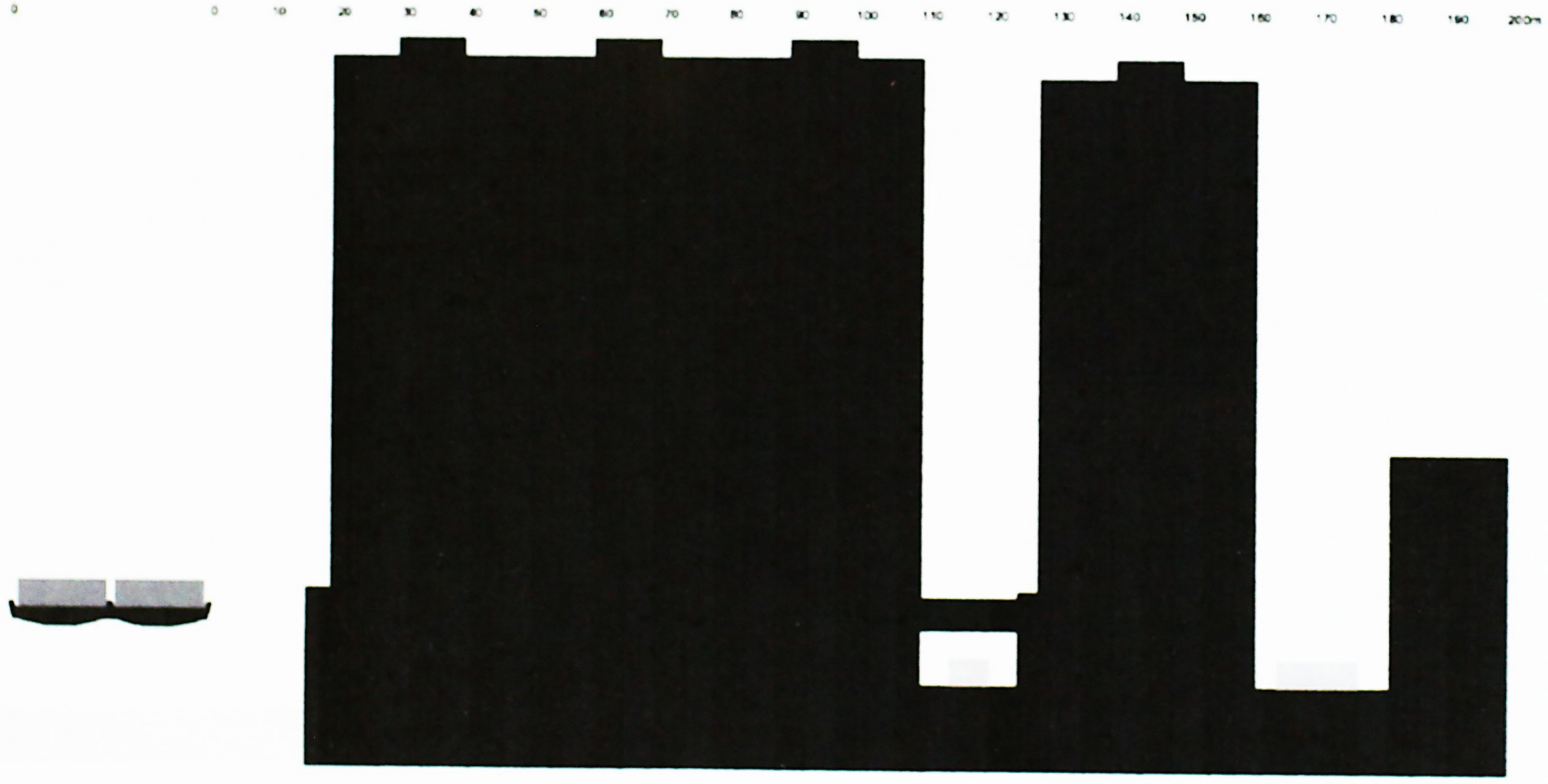
FORTRESS HILL - EASTERN CORRIDOR

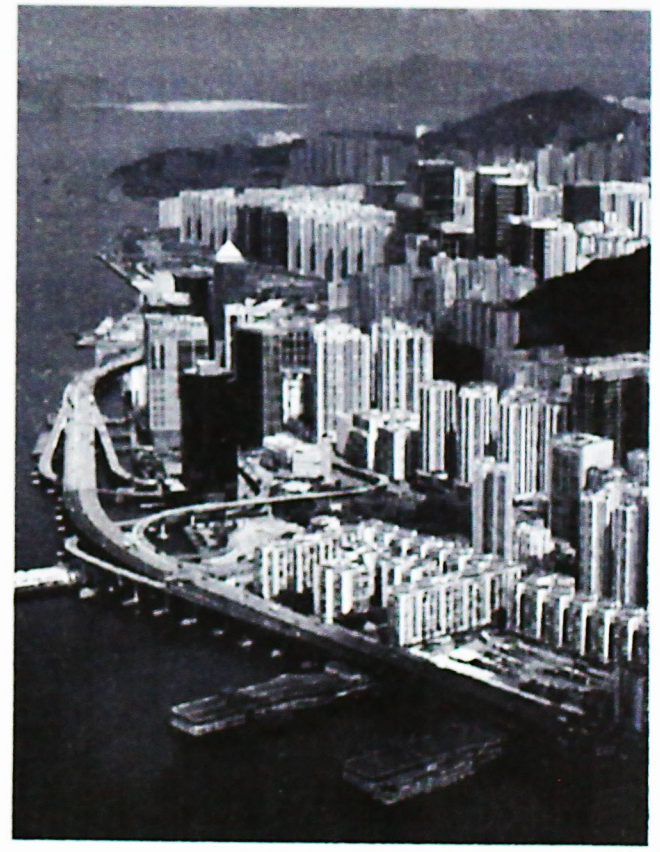


Typology Definition

Type 5 - Flyover and Water







Type 6 - Flyover as Place

Definition: Flyover at roundabouts

This type includes all flyovers at roundabouts. They often occupied vast amount of space. The area of the roundabout in Causeway Bay near the entrance to the cross harbour tunnel is comparable to a standard soccer pitch. Some of the spaces they occupied, like those by the harbour, are among the most advantageous locations in the city.
Their physical forms are determined by technical considerations, mostly the turning angles for vehicles. As a result, the shapes of the spaces defined within them are inevitably "odd" and irregular. Some of those spaces now are landscaped and converted into parks; some of them are just left opened.

Issues for further studies:

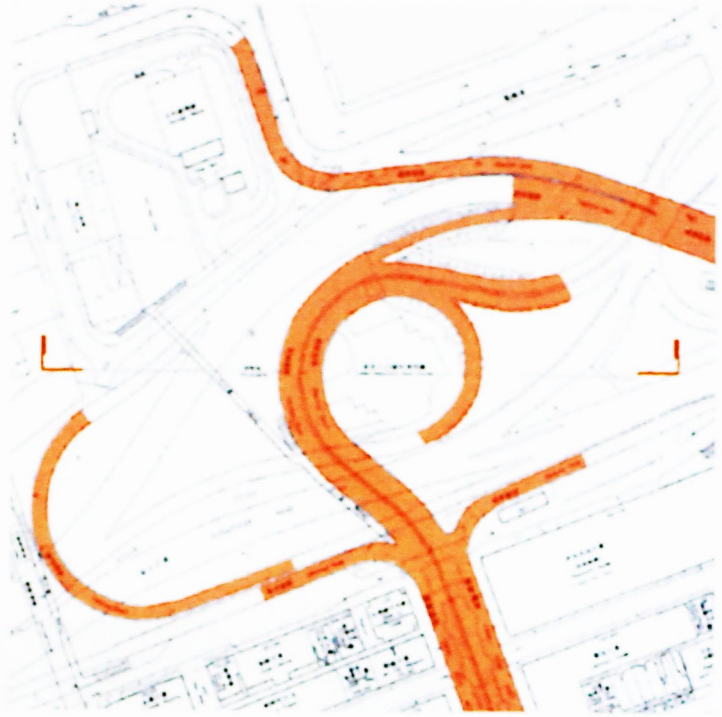
1. Accessibility: vehicular and pedestrian
Though the spaces are defined by roads and flyovers, they themselves are not accessible by vehicles.

2. Connectivity
The form and shapes of roundabouts contrast greatly with the urban fabric. So the roundabouts are usually located out of the general fabric and have no relationship between it. This poses an issue of connecting people between the two areas.

3. Scale
At the roundabouts, the forms and shapes, as well as the scale are designed for vehicles. To develop the spaces on roundabouts, one of the issues is how to introduce human scale to them, and the relationship between two scales.

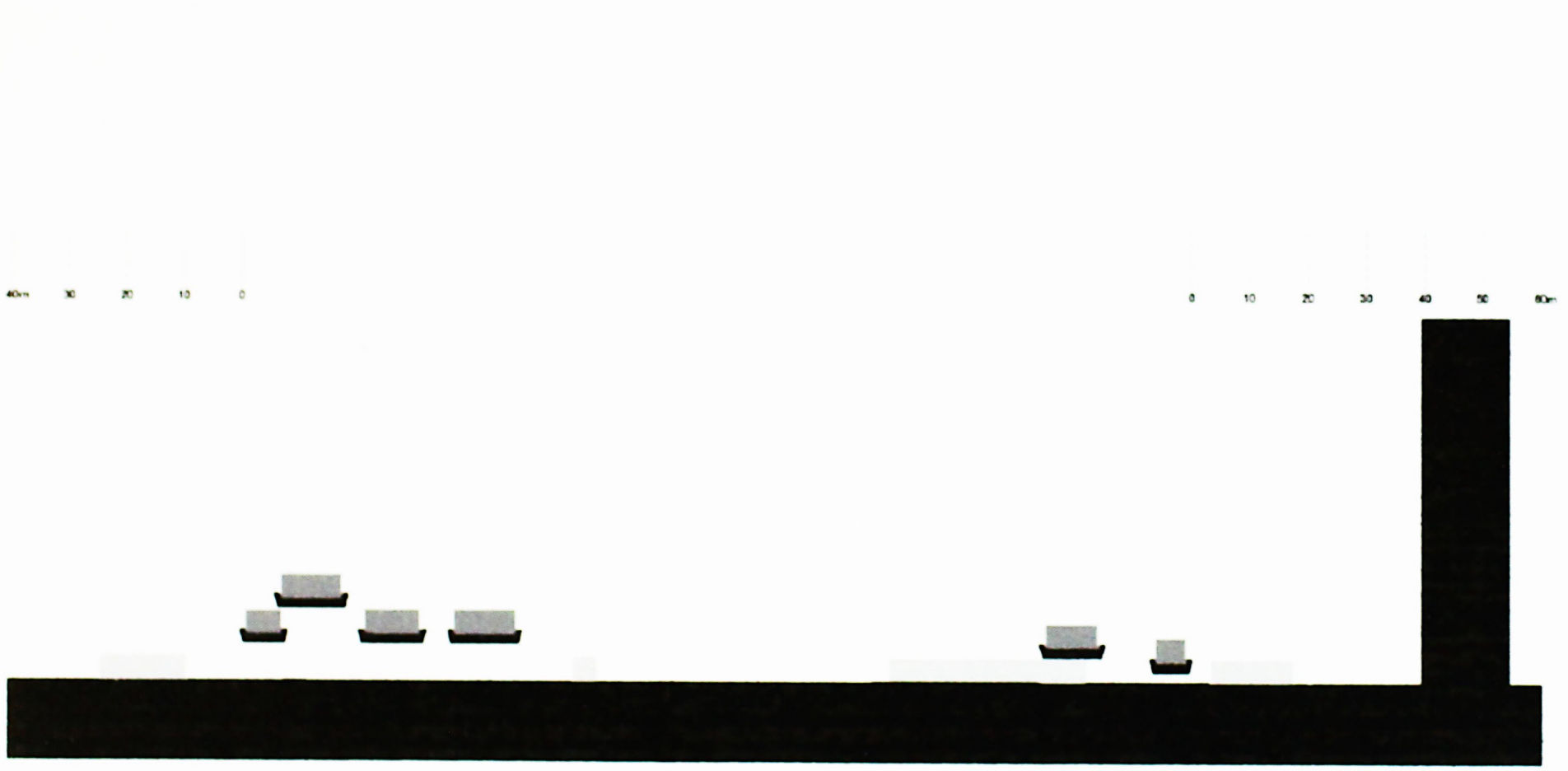
4. Spatial geometry and development

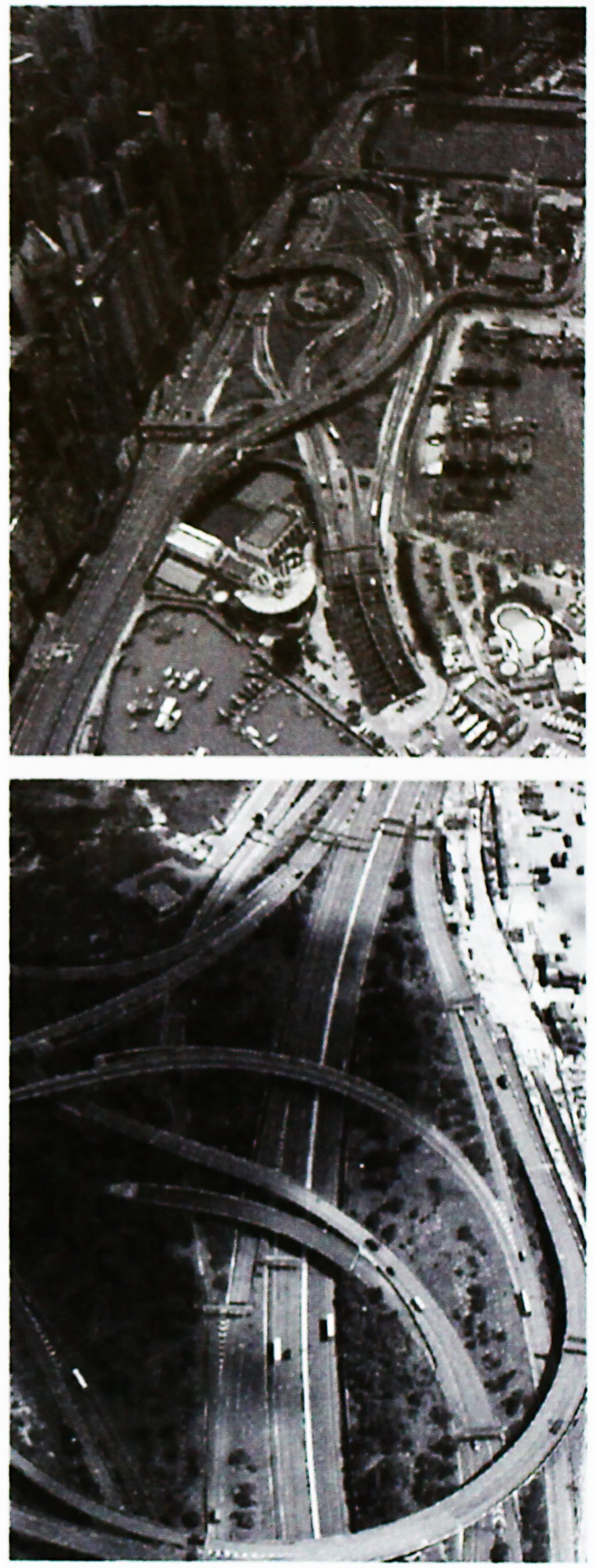
CAUSEWAY BAY - CANAL ROAD FLYOVER



CHOI HUNG - KWUN TONG BYPASS

Type 6 - Flyover as Place





ii. Research Main Body

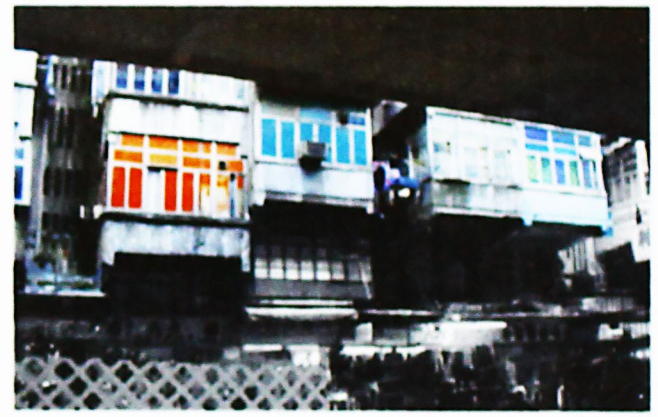
From the analysis of different types of flyovers in Hong Kong, it is realized that the flyovers have not only posed problems to residents in buildings next to them, but also pedestrians who pass underneath them. So, it is essential to look at the problems with flyovers from residents' and pedestrians' perspectives. Besides, driving nowadays has become a major experience in the city, so it is not acceptable to reach a solution to the problems at the expense of drivers' experience.

The solution to the problem should be made through considerations from pedestrians', residents' and drivers' perspectives. As a result, the research is structured into three sections: The Pedestrians' Perspective, The Residents' Perspective, and The Drivers' Perspective.

The Pedestrians' Perspective section will examine, through existing examples, the identities of the spaces under flyovers and the roles of those spaces in the area where flyovers pass through.

The Residents' Perspective section will look at how the flyover affects residents in different types of buildings next to them. It will also look at how some new building types are designed to reduce the adverse effects from flyovers to the residents.

The Drivers' Perspective section will analyze the experience of drivers on the flyovers and account for different experiences on flyovers. It will also attempt to find out what make a place recognizable on flyovers and create a "sense of place" from the drivers' perspective.

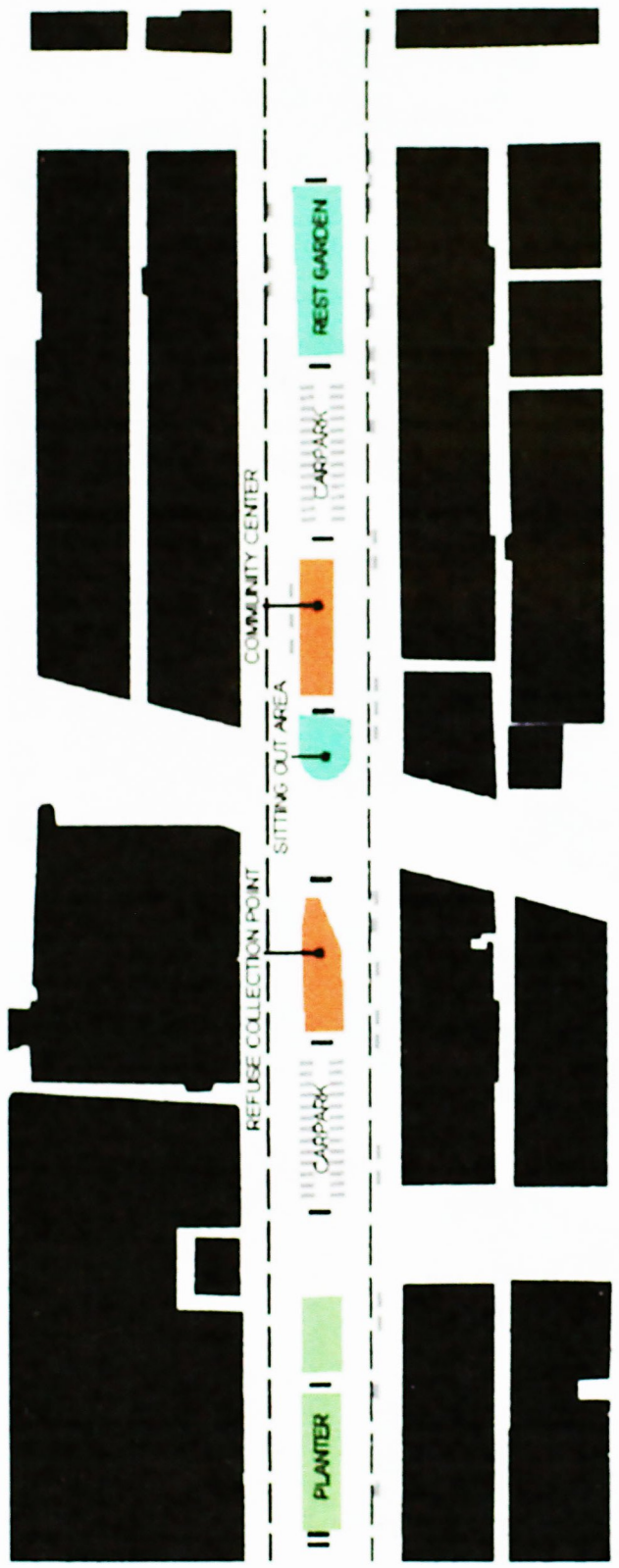


Pedestrians' Perspective

The Pedestrians' Perspective section will examine, through existing examples, the identities of the spaces under flyovers and the roles of those spaces in the area where flyovers pass through.

Hong Kong is a dense city, urban spaces are valuable, so do the spaces under flyovers passing through the urban areas in the city. Spaces under a lot of flyovers are utilized and play a role in the neighborhood. Some have even become a place for social gathering or landmark for an area. But there are also spaces under flyovers left vacant for some reasons.

Looking at the example of Ma Tau Wai, within a distance of 250 meters, there are one rest garden, one sitting-out area, one community centre, one refuse collection point, and two parking areas under the flyover. The usage of the spaces under flyover is intensive and of wide variety. The sitting out area has become one of the vital places where the elderly get together and socialize. The community centre provides spaces for neighborhood functions. The refuse collection point collects rubbish in the area, especially the nearby market complex and shops on two sides. So, here the spaces under the flyover house functions vital to the neighborhood.



Roles of spaces under flyover in Ma Tau Wai


Structure under flyover - as Community Center

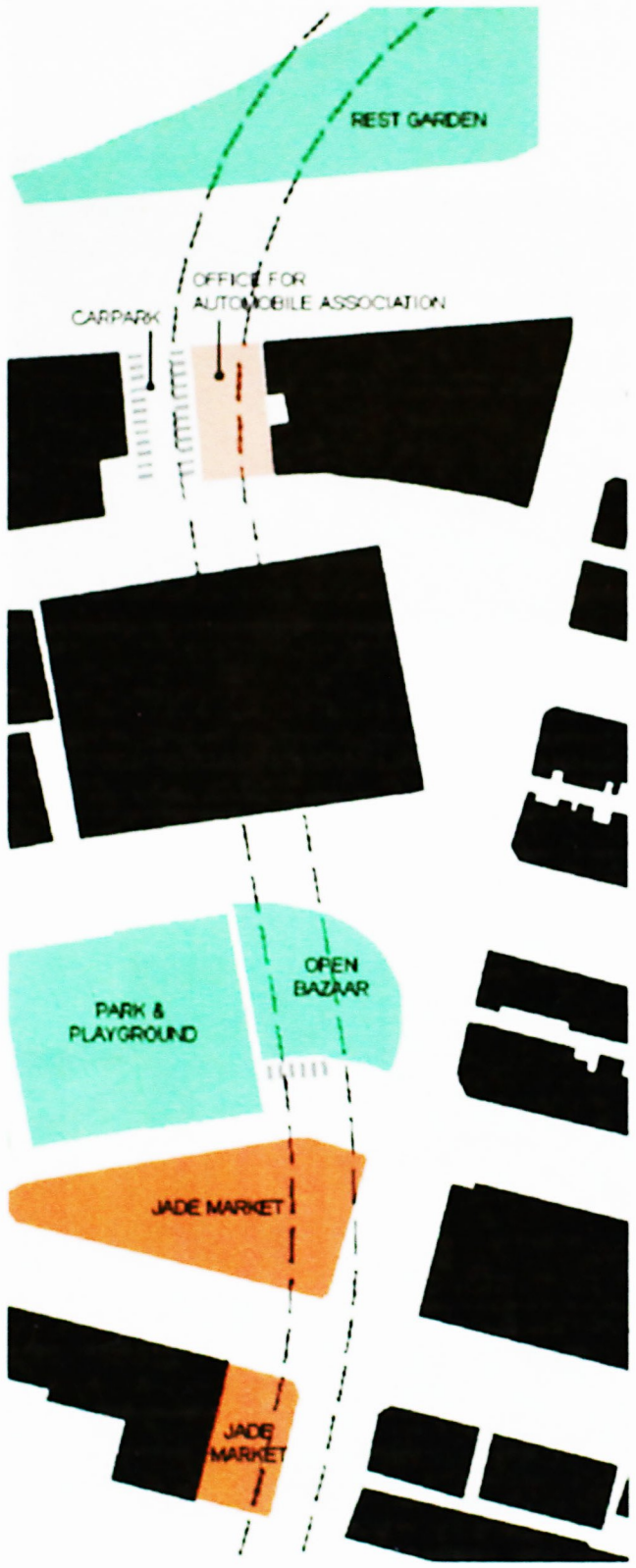

Open space under flyover - as Sitting-out Area


Open space under flyover - as Parking Area


Open space under flyover - as Planter

Looking at another example of Yau Ma Tei, the usage of space under flyover is also intensive. There are jade market, open bazaar, rest garden, one-storey office, and parking area under the flyovers. The open bazaar and rest garden serve the neighborhood. The jade market has become one of the landmarks in the district and a tourist attraction with strong local characteristics.

The usage of spaces under flyover can be generally classified into usage with built structures and usage without a built structure. The following investigation will be based on these two categories. It will look at a number of existing cases and attempt to draw findings from them.



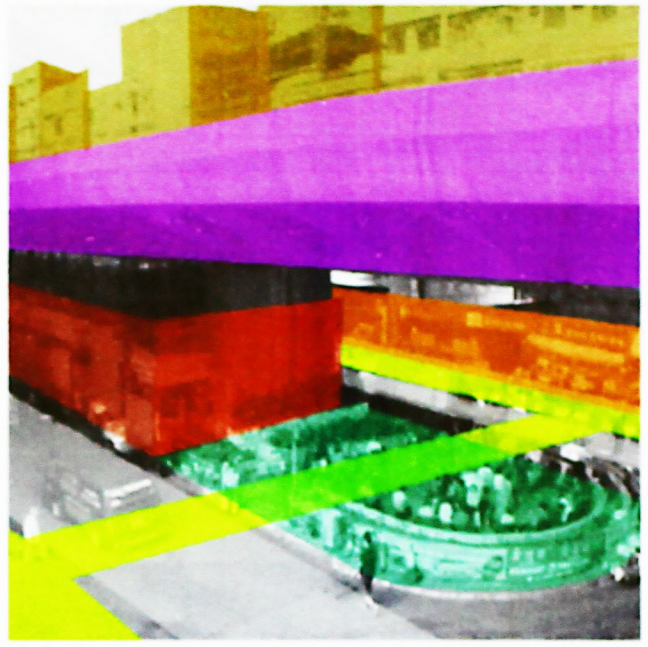
Roles of spaces under flyover in Yau Ma Tei

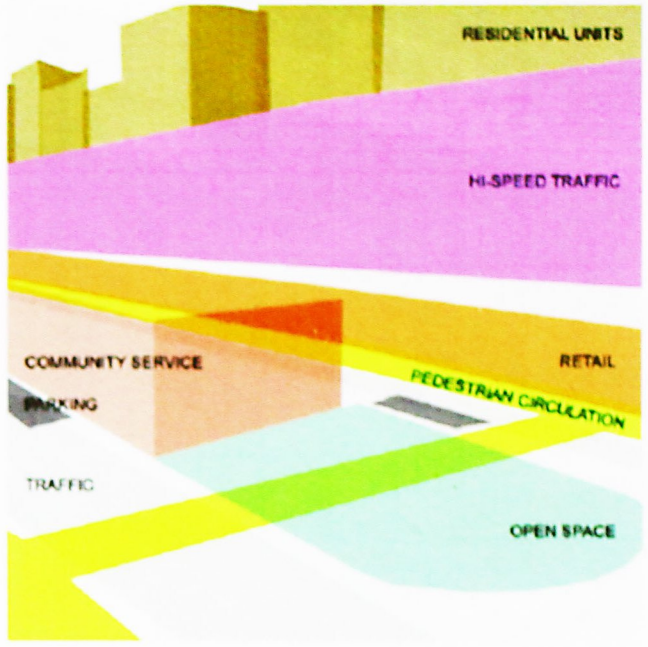
Open space under flyover - as Bazaar

Open space under flyover - as Parking Area

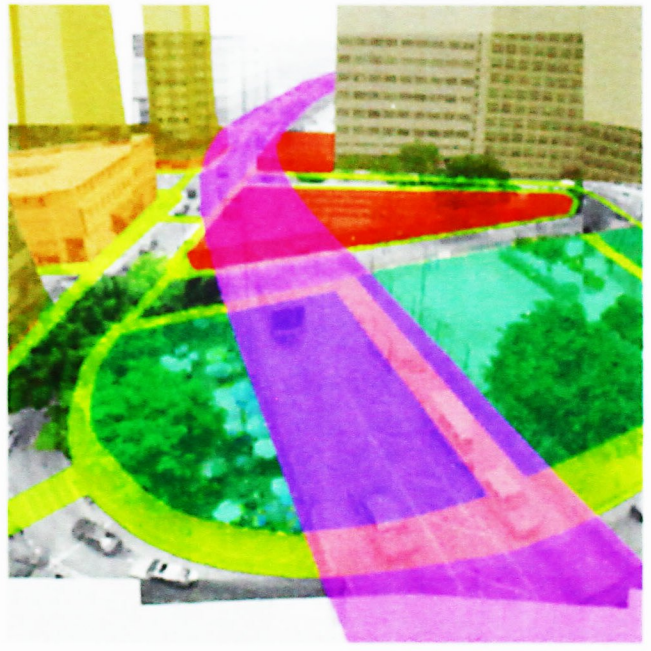
Open space under flyover - as Rest Garden

Structure under flyover - as Jade Market





Ma Tau Wai
Close relationship between flyover and neighborhood



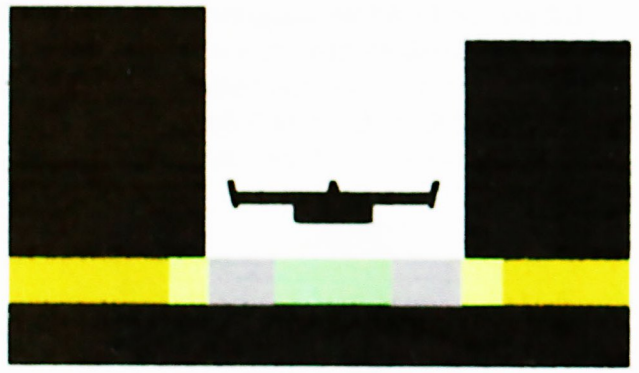
Yau Ma Tei
Intensive use of spaces under flyover

Apart from the assigned usage to the spaces under flyovers, there are also uses generated by the people themselves. The below diagrams show the assigned uses and the actual uses of spaces on the ground plane in Ma Tau Wai. We notice that the use of a space is generally mixed. Take the sidewalks as example, they are not merely used for pedestrian movement, at some places, shops extend to the sidewalks to attract more business, making the sidewalks retail spaces too. Spaces are used according to individuals' adaptation to the environment.

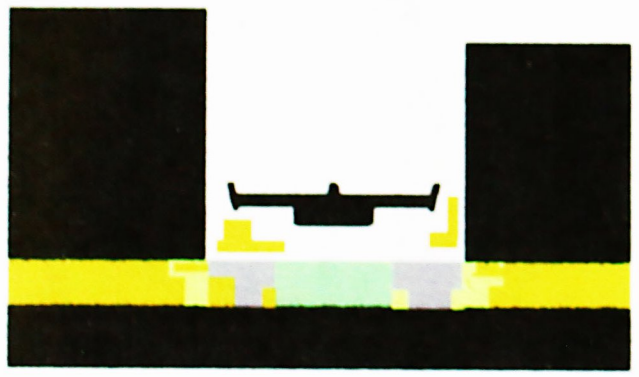
The spaces under flyover are used in a similar way too. In some cases, those spaces are used for temporary storage of goods, parking of trolleys, "homes" for homeless people etc. A lot of them have become shelter for small scale commercial activities, there are hawkers selling goods under flyovers and even people providing haircut services.

Temporary storage - Ma Tau Wai

A Home for homeless - Ma Tau Wai



Assigned Use on the ground plane in Ma Tau Wai



Actual Use on the ground plane in Ma Tau Wai

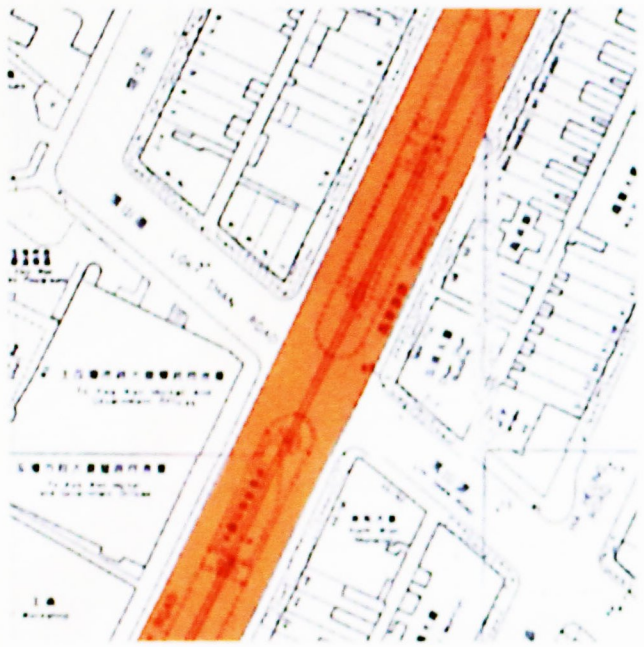
Trolley parking area - Causeway Bay

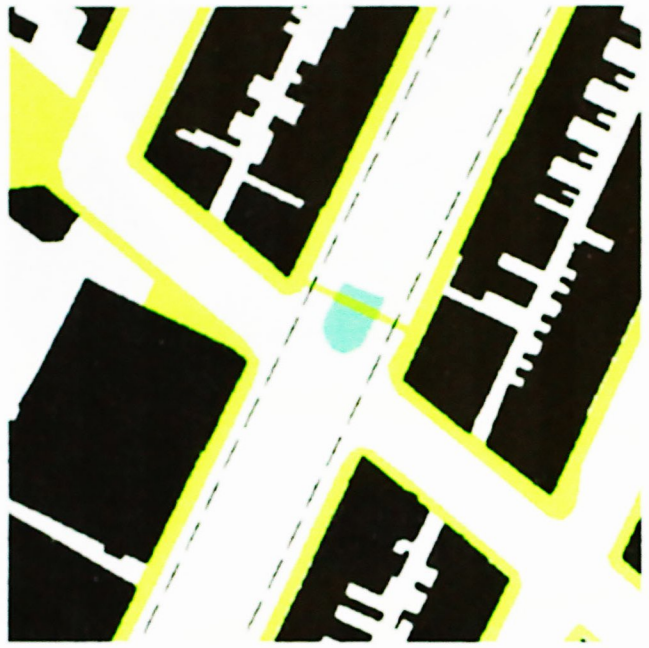
A Hawkers' market - Causeway Bay

A Hair salon - Choi Hung

Ma Tau Wai – East Kowloon Corridor Sitting Out Area

The open space here is only a small sitting out area. However it is one of the vital open spaces in the neighborhood where a lot of elderly like to gather and socialize. The space is cut through by the pedestrian crossing, and visible from pedestrians around. There is also adequate daylight as it is located near road intersection, where more daylight comes in from the perpendicular roads.





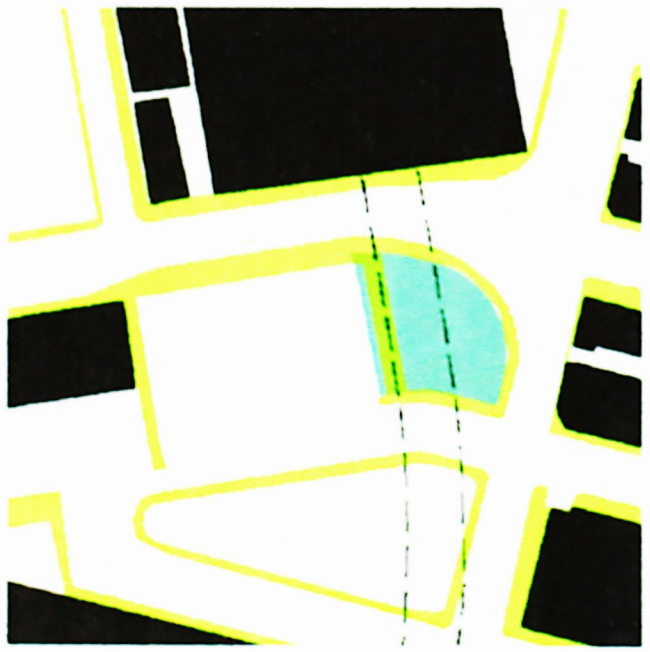
Space intersected by pedestrian crossing

Space visible from pedestrians nearby

A vital social space for the neighborhood

Yau Ma Tei – Shanghai Street Open Bazaar

The open space is used as an open bazaar where a lot of hawkers gather. Again it is cut through by a pedestrian route and is visible from nearby. Daylight is abundant because of the type-two physical relationship between the flyovers and buildings, where there is enough space for sun-light comes in between the flyover and building.



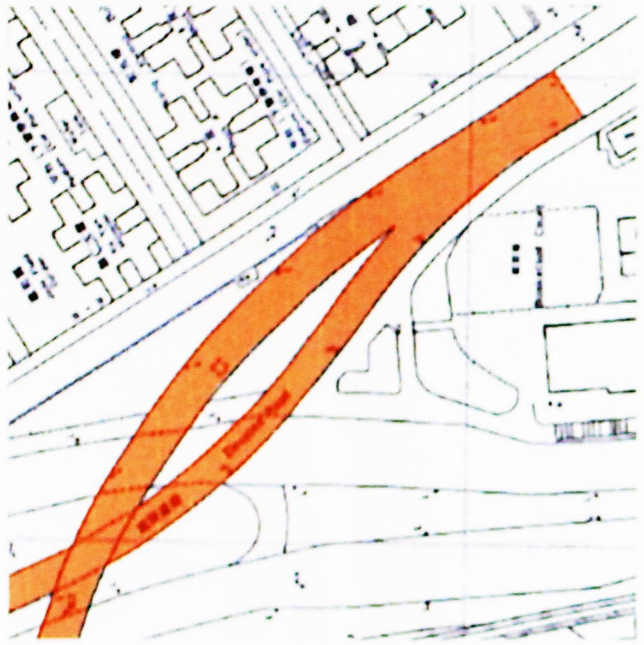
The flyover partially covers the bazaar

Gathering and social space for Hawkers in the area

Hawkers selling goods to pedestrians passing by

Ngau Tau Kok - Ngau Tau Kok Road Flyover Rest Garden

The open space is used as a large rest garden. It is penetrated by pedestrian routes. The garden is surrounded by planters which make it still visible from nearby. It is a safe place where a lot of elderly gather and socialize.



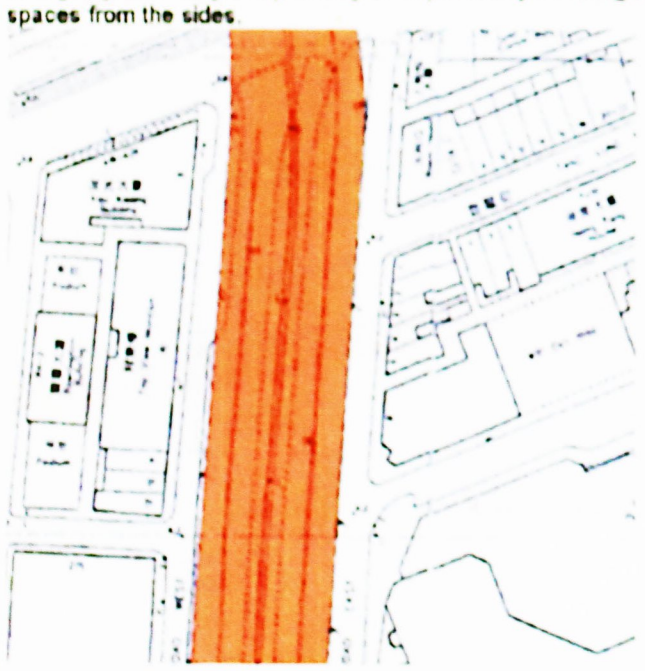
A vital social space for the elderly

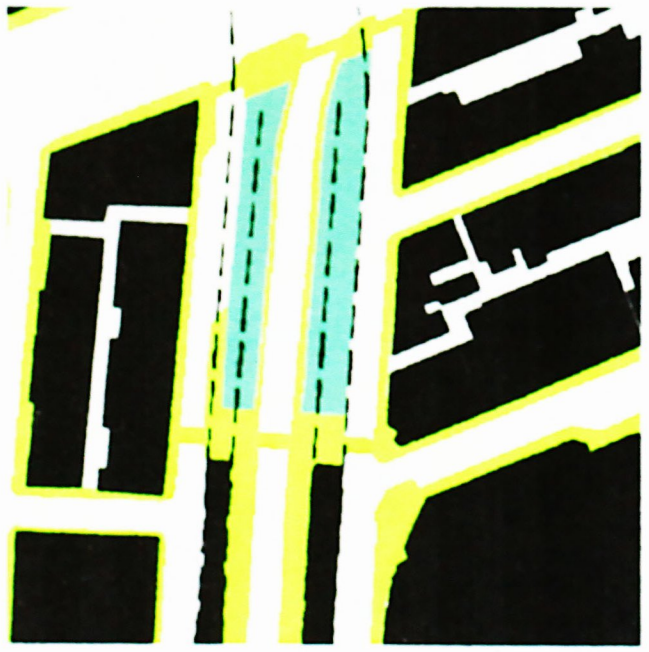
Space surrounded by visually-permeable planters

Lots of entries allowing pedestrians "flow" into the space

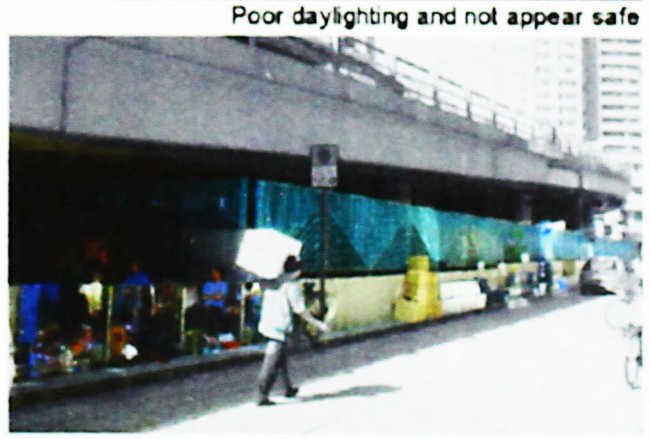
Causeway Bay - Canal Road Flyover Sitting-out Areas

The open spaces are used as two sitting-out areas. They are not cut through by pedestrian route, but rather entered from the two ends. They are enclosed by glass-block wall on one side and steel bars on the other, and thus not considered visible from pedestrians nearby. Daylight is not adequate at some hours during the day. For the east-facing space, daylight is adequate in the morning but not in the afternoon, and vice versa for the west-facing space. The spaces do not appear safe even during daytime. They can probably be improved by knocking down the wall facing the sidewalks and allow free entry into the spaces from the sides.





Poor daylighting and not appear safe

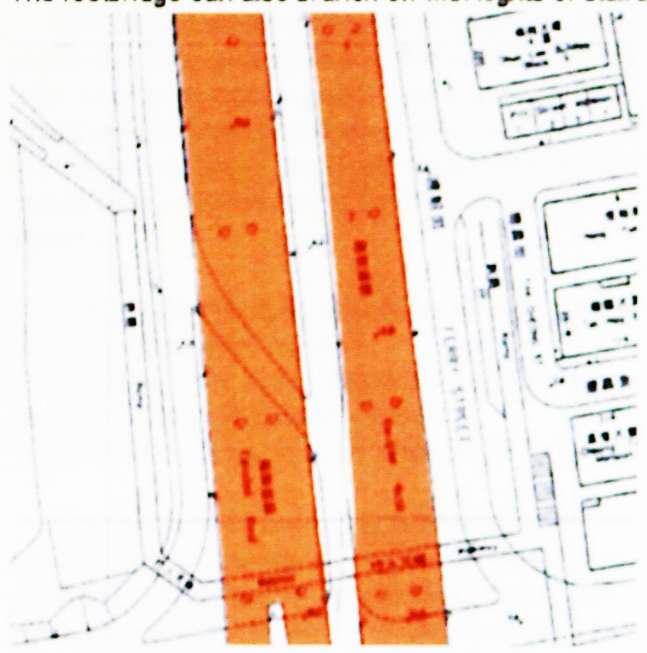


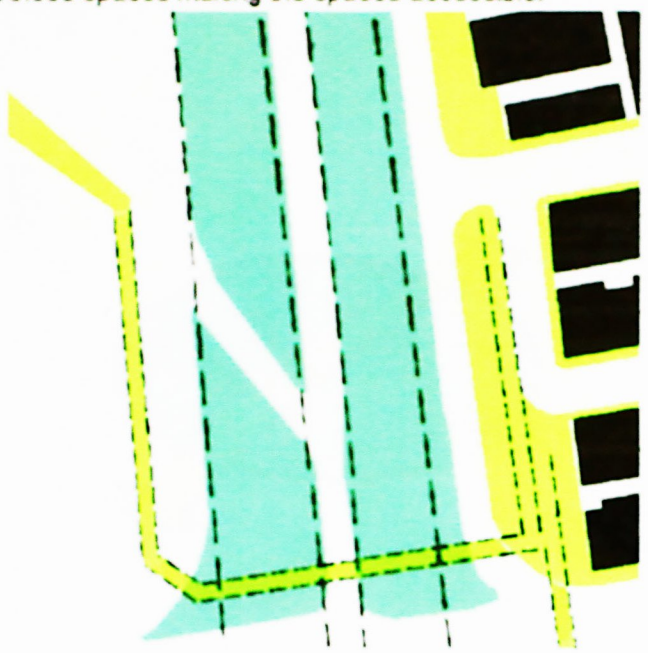
Space hardly visible from nearby

Entry restricted on two ends

Yau Ma Tei - Spaces under Ferry Street Flyover

The space here under flyover is vast. However it is presently left empty only with some spaces occupied by homeless people. It is not cut through by a pedestrian route as there is no pedestrian crossing on the ground plane. Pedestrians are to cross the roads through footbridge. However, the space is visible from nearby and daylight is adequate. The space could probably be well utilized if pedestrian crossing on ground is introduced. The footbridge can also branch off with flights of stairs at those spaces making the spaces accessible.





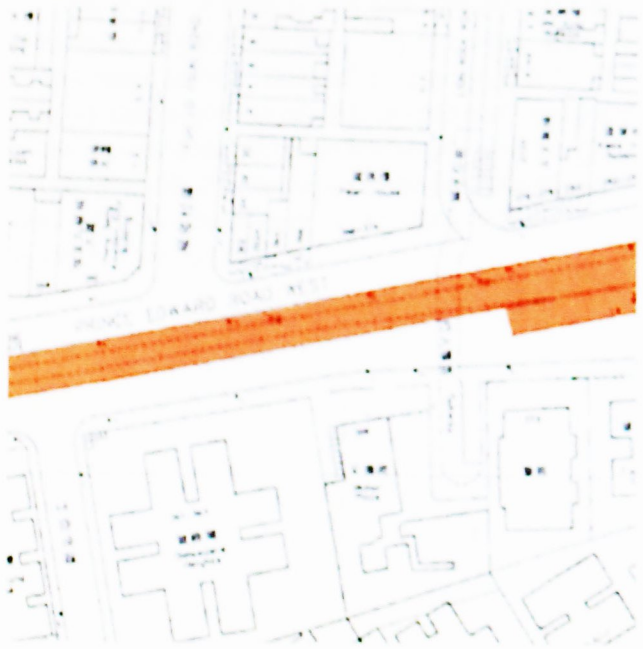
Vast space only occupied by homeless

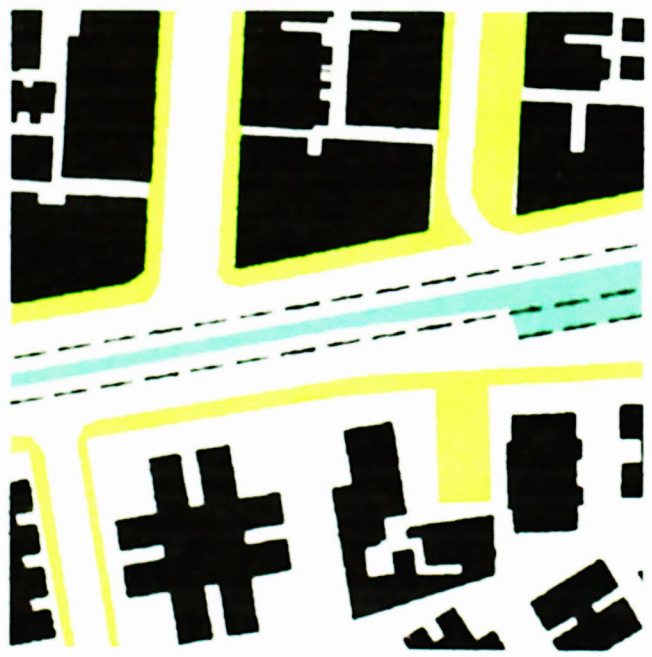
Footbridge for crossing

No pedestrian crossing on ground

Kowloon City – Spaces under Prince Edward Road West Flyover

The spaces are presently only occupied by planters. They are narrow, with a width just wide enough for the structure of flyover. They are also not accessible, and it is also difficult to introduce pedestrian crossings on the ground plane because of the busy nature of traffic. So the spaces may not be suitable for having a use. Filling the spaces with plants may be the best choice.

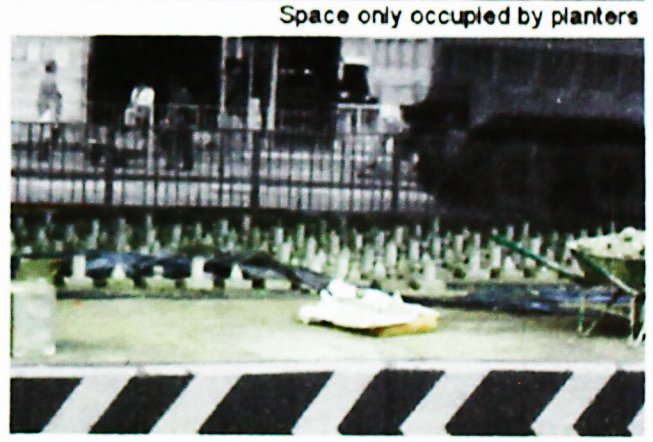




Space just wide enough for flyover structures

Space only occupied by planters

Space only occupied by planters



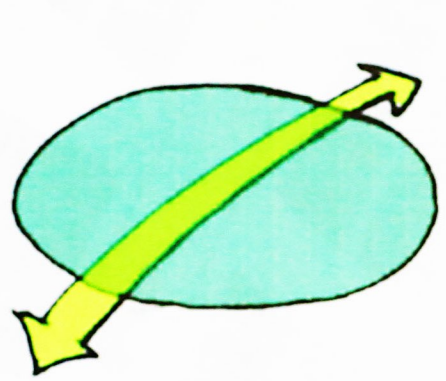
Measures to prevent "unwanted" use of space

We looked at six examples of open spaces under flyovers, among them, some are working well, some are not as good, and some are left unoccupied. From these examples, we can conclude that there are three major criteria for public open spaces under flyovers to be successful.

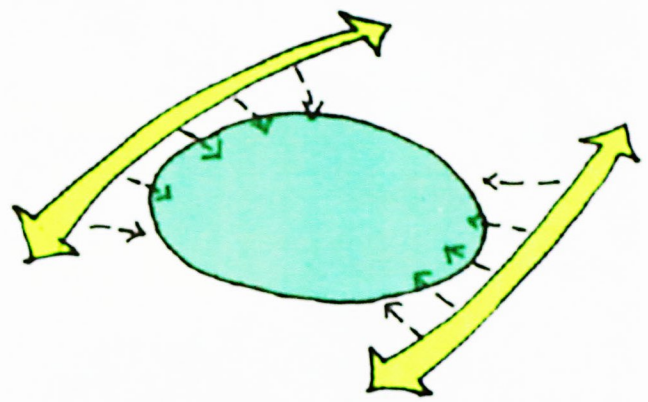
1. That the public open space be intersected by a public circulation route.
2. That the public open space be visible from general public circulation nearby.
3. There should be enough amount of daylight.

The first criteria is mainly related to the accessibility of the open spaces. Besides, the constant movement of people keep the space alive. The second criteria are mainly related to the safety issues of the open spaces. The settings of some flyovers may be ideal for illegal activities like gambling and drug dealing. The visibility to the space from pedestrians nearby helps to prevent them from happening. The third criteria is needed for social activities to happen. It also helps prevent illegal activities from happening.

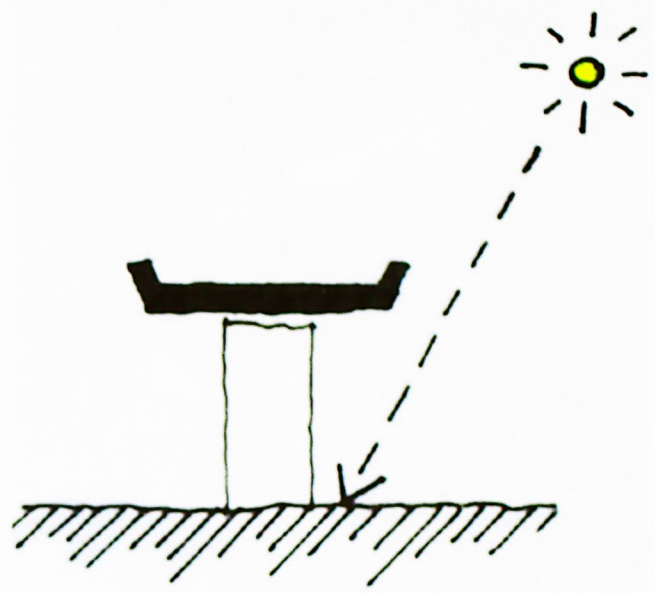
The three criteria are in turn determined by a number of other factors. For example, the first criteria would depend on the feasibility of having pedestrian crossing on ground, the third criteria would depend on the width and height of the flyover, the distance between the flyover and adjacent buildings or location of the spaces themselves.



That the public open space be intersected by a public circulation route.



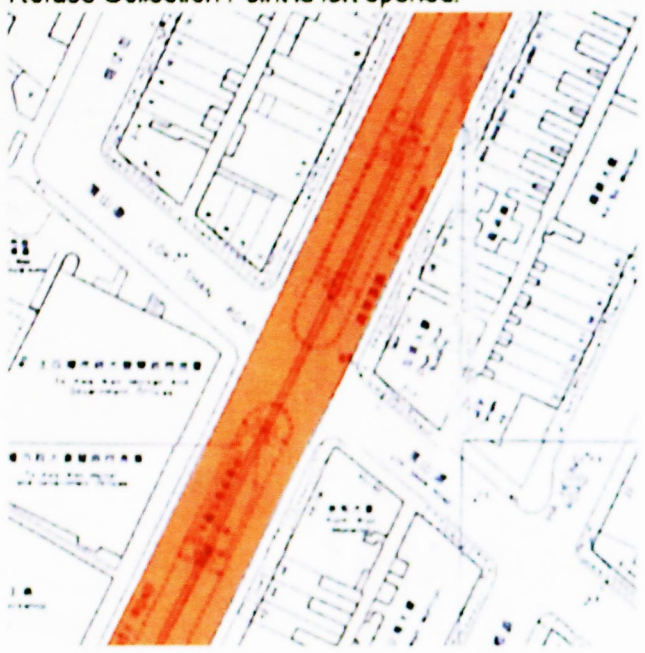
That the public open space be visible from general public circulation nearby.

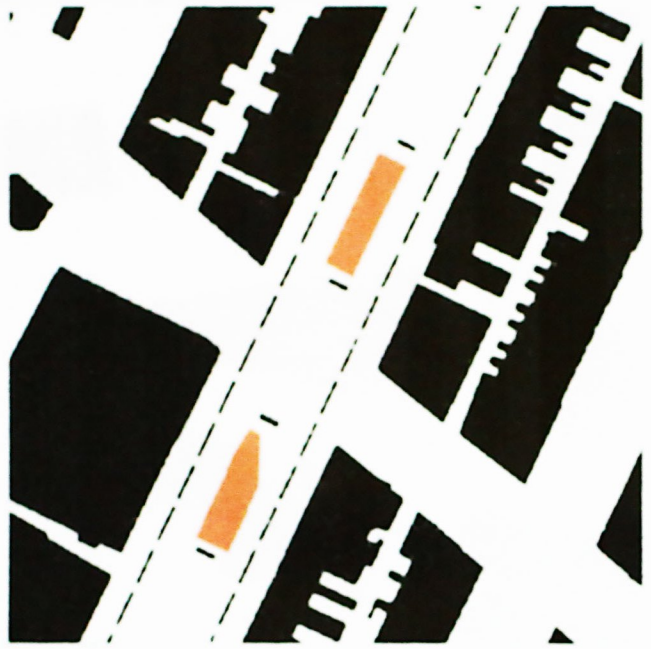


There should be enough amount of daylight.

Ma Tau Wai – Community Center and Refuse Collection Point

Both buildings are one storey concrete structure standing individually under the flyover. Both took linear forms along the flyover. The lengths of the buildings are confined to one bay of the flyover structure. There are spaces left opened between the top of the buildings and the bottom of the flyover. For the community center, the roof is used as a boxing arena surrounded by an additional steel frames, while the space above the Refuse Collection Point is left opened.



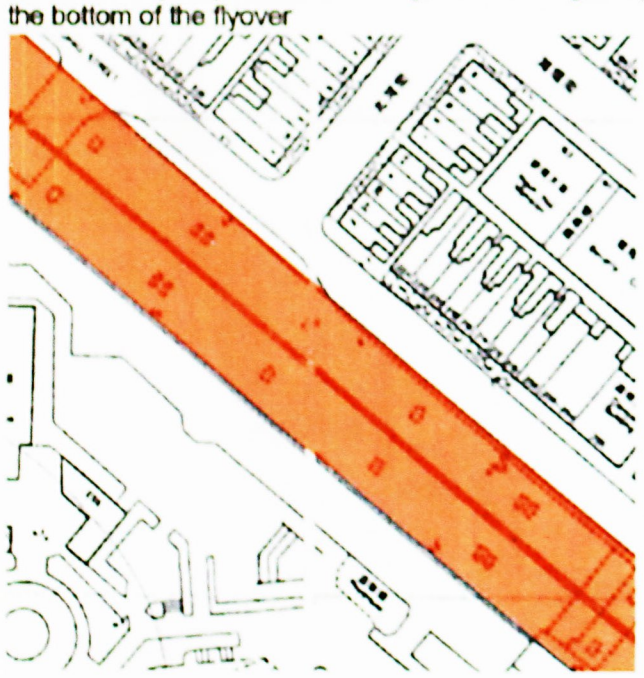


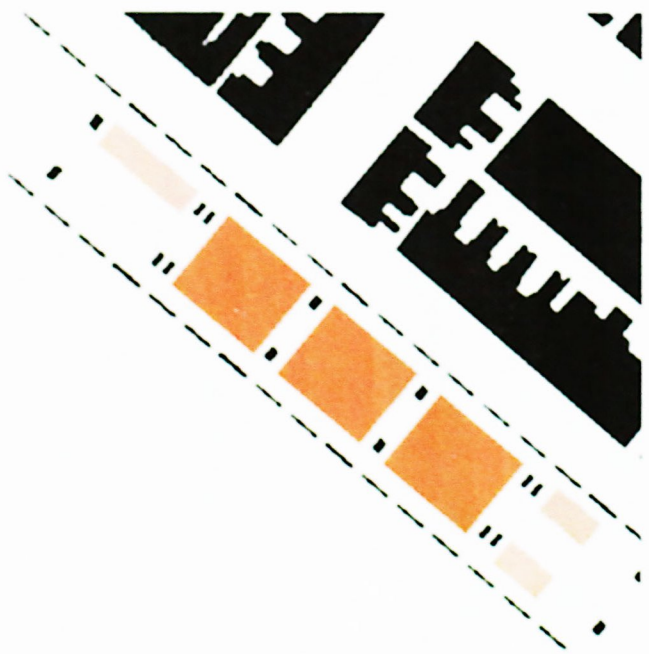
Refuse Collection Point

Community Center - with a boxing arena on top

Sham Shui Po –Tung Chau Street Temporary Market

The market is composed of three identical steel frame structures. They took linear forms and were situated in three bays of the flyover structure. Theirs sizes are related to the flyover, where their lengths are determined by one bay of the flyover structure, and their widths determined by the distance between the two flyovers structures. As they only have one storey, there are again spaces left opened between the top of the buildings and the bottom of the flyover.





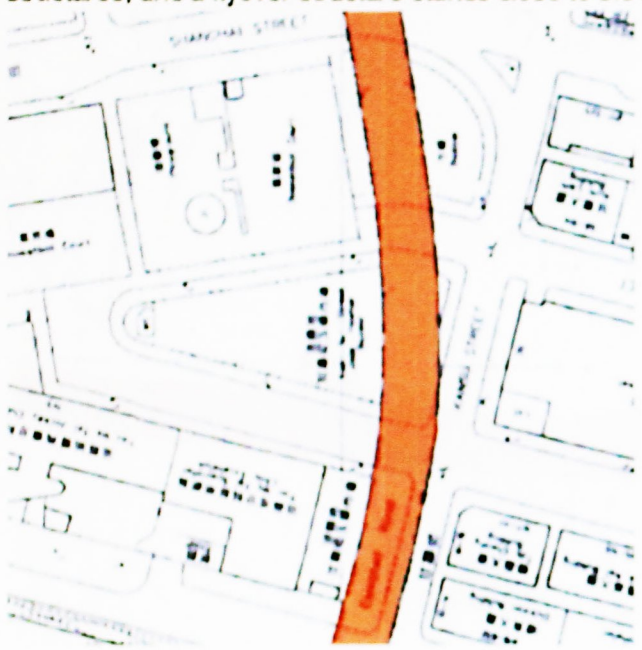
Market as one-storey steel structure

Three buildings in three structural bays

Service buildings next to the market

Yau Ma Tei – Jade Market

The jade market is a triangular-shaped one-storey steel frame structure. The form of the market follows the shape of the parcel and has no relationship with the flyover; so do the structural division and its framing direction. As a result, there are conflicts between the flyover structure and the jade market in structural and spatial terms. For example, the rhythm of structural framing of the jade market is disturbed at the positions of flyover structures; and a flyover structure stands close to the main entrance to the jade market.



Jade Market follows the shape of the parcel

The flyover and the Jade Market are independent

Flyover structure close to the main entrance

Inside the Jade Market

Tsim Sha Tsui – Haiphon Road Market

The market is a cluster of a number of structures. There is mainly one major steel frame shelter, another tall one for loading and unloading vehicles, and a number of individual stalls and small buildings below. The major shelter only shades the area not covered by the flyover, in the area below the flyover, the bottom of the flyover is the ceiling of the market. The headroom for the space below the flyover here is short, it is interesting to see a close relationship between people and the flyover structure. One can touch the structures or even "decorate" them.

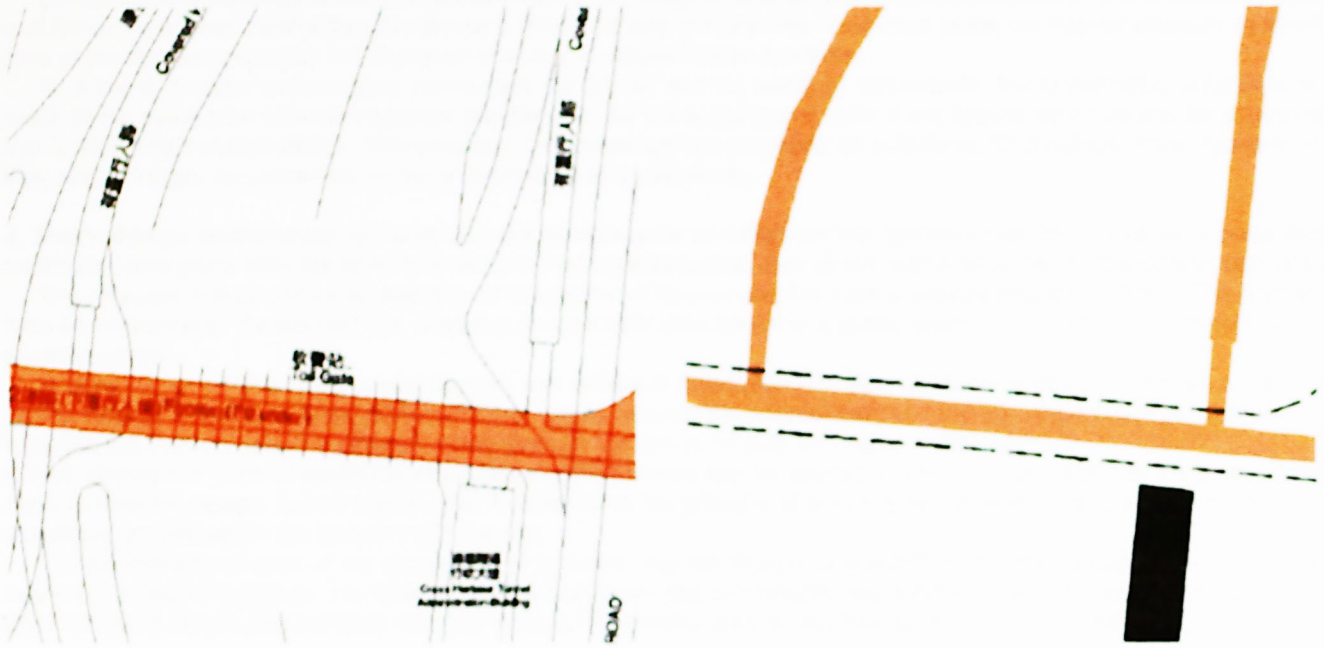
Market as a cluster of individual structures

Individual small buildings and stalls under flyover

Mind your head

Hung Hom – Pedestrian footbridge and Booths

This is the only example where the structures for the functions below were built together with the flyovers. The spaces below the flyover are used as pedestrian footbridge and the booths. The pedestrian movement along the direction of the flyover is a unique feature which cannot be found in other cases. There is also integration in the design of the flyover structure and the function below. The openings in the flyover structure correspond to the width of the footbridge; and the structural bay of the flyovers also relates to the spacing of the booths underneath.

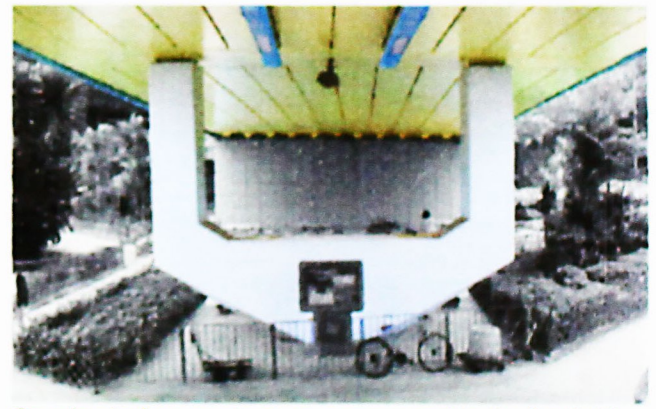


Ground level used as booths

Pedestrian movement underneath along the direction of the flyover

Footbridge under flyover passing through the structure

Foorbridge connected to ground with sscalator and stairs



Opening in flyover structure correspond to the footbridge

After looking at some local examples of built structures under flyovers, the following conclusions can be drawn:

1. The possible uses of spaces underneath should be considered and designed together when the flyover was built.

From the examples we examined, there are two major limitations for adding buildings under existing flyovers

I. The nature of flyover structures including their spacing and forms actually pose constraints and limitations to what the buildings underneath can become.

II. The structures of the buildings underneath have to be separated from the structure of the flyover. As the flyover structure cannot carry the loading of the buildings underneath; and the vibration of flyover structure could adversely affect a building that structurally attached to it.

So the existing buildings under flyovers are mostly individual structures standing by themselves; and in cases of type-one flyover and adjacent buildings relationship, their sizes and forms were often confined by the flyover's structural bay. While in the Hung Hom case, the flyover structure is also the structure for the functions below; and the spacing and form of the flyover structures are designed in a way to support those functions.

As a result, in order to thoroughly incorporate the flyover and the buildings underneath, the fundamental solution is to consider and design the possible uses of the spaces underneath at the same time when the flyovers are planned. So the spacing and form of the flyover structure can be determined by the requirements from functions underneath, in addition to technical considerations. Nevertheless, the followings are proposed as guidelines for buildings under flyovers, to better integrate the existing flyovers with the areas that they pass through, as perceived on the ground plane by pedestrians.

2. The buildings underneath flyovers can act as elements to integrate the flyovers with the areas they pass through. This is achieved by the design of buildings underneath that integrate with the flyover in formal and spatial terms, and at the same time have interaction with the surroundings.

The adjacent picture shows an example of integration of flyover and the area it passes through in Tokyo. The spaces under flyover are used as shopping arcade that follows the form and direction of the flyover. The shopping arcade itself also opens to a public square. So the flyover, the built structures underneath, and the spaces nearby integrate to form an urban place.

In Hong Kong, most buildings under flyovers are individual structures with little relationship with the flyovers except that their sizes are often constrained by the spacing of the flyover structure. Besides, most of them are one storey, leaving the spaces between the top of the buildings and the bottom of the flyovers opened. There is also little attempt to integrate the flyovers with the adjacent areas through the design of built structures underneath.

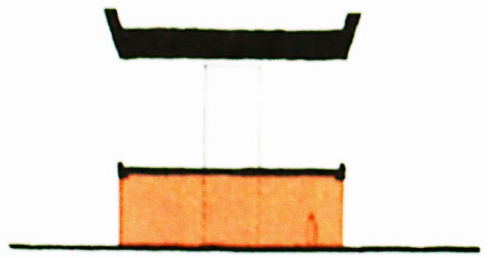
In fact, alternative ways of designing of buildings under flyovers can be explored, which address more to the unique form of flyovers and spaces underneath them, and see those as opportunities for design. But no matter what form is taken, the ultimate goal of the design should be to enable more interactions between the buildings under flyovers and the surroundings, and integrate the flyovers with the city.

But the intensity of uses of the spaces under flyovers, and the degree of interaction with the surroundings depend very much on type of physical relationship between the flyovers and adjacent buildings. For sites with more limitations and constraints, the buildings may be only one storey and the interactions with the surroundings may be just visual; while for some others, the buildings can fully occupy the spaces underneath flyover and the interactions with the surroundings can be physical.

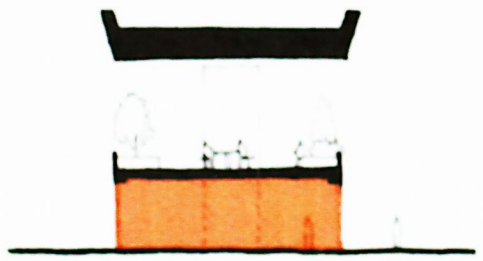
3. There can be a "sense of place" of being under flyovers

The spaces under flyovers are unique features in the city. From our experience in the Tsim Sha Tsui example, it is interesting to see the close relationship between people and the flyover structures. So in the design of buildings under flyovers, it is interesting to celebrate the existence of flyover structures and let one realize that they are under the flyovers. This can be done by leaving the bottom of flyovers as ceilings or revealing flyover structures to people.

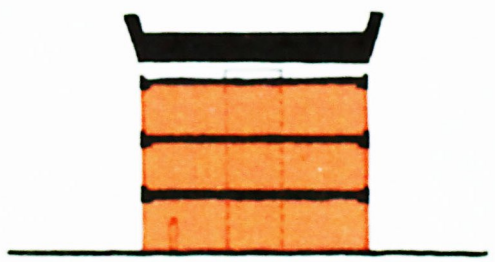
Example of shopping arcade under flyover in Tokyo



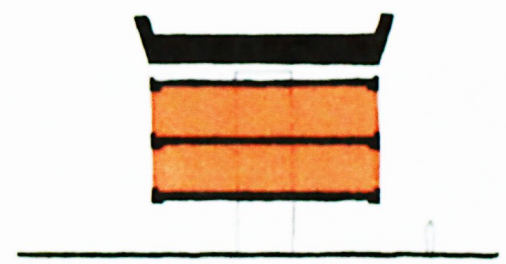
Most existing buildings under flyovers



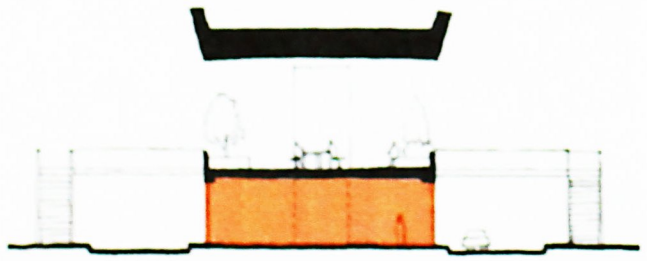
Open space above one-storey building



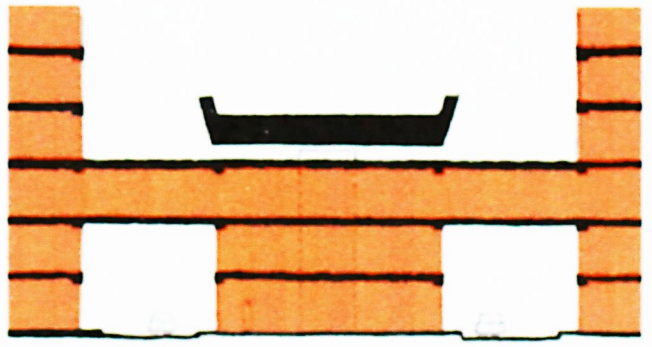
Building fully occupies spaces underneath flyover



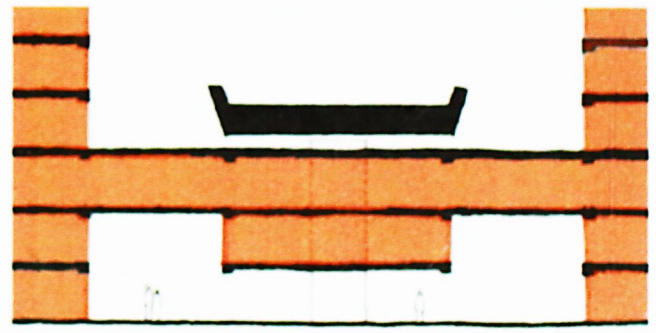
Building elevated leaving ground plane opened



Open space connected to the surroundings by footbridge



Building underneath connected to adjacent buildings

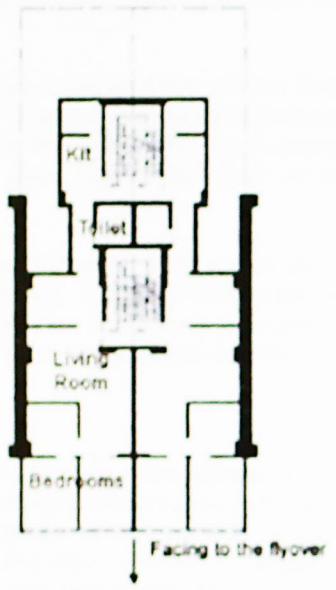


Building underneath connected to adjacent buildings

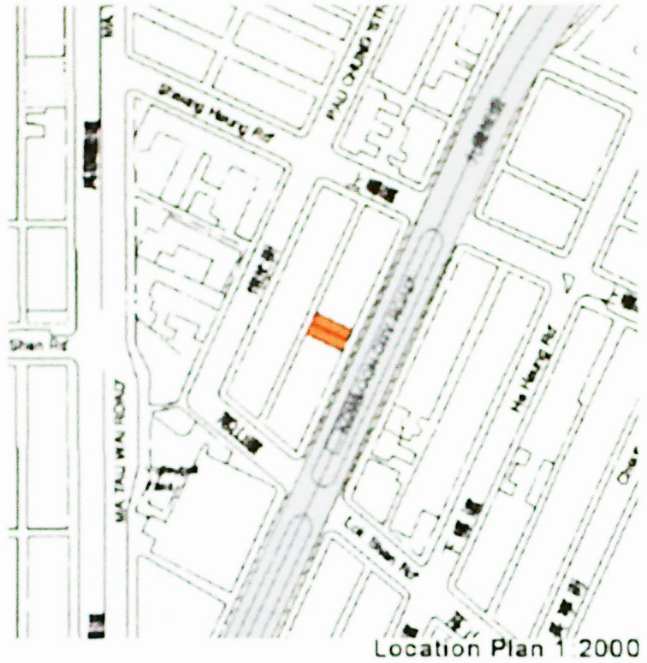
Residents' Perspective

The Residents' Perspective section will look at how the flyover affects residents in different types of buildings next to them. It will also look at how some new building types are designed to reduce the adverse effects from flyovers to the residents.

Kowloon City Road - Ma Tau Wai



2/F Floor Plan of No.17 & 19, Kowloon City Road



Location Plan 1:2000

In Ma Tau Wai, some of the buildings are very close to the flyover, the Kowloon Eastern Corridor. This building is one of them and it was built before the construction of the flyover. Therefore the building layouts were not designed to reduce the physiological impact caused by the flyover. Its building facade above ground floor extrudes out of the site boundary about 2m, leaving a very short distance between the building and the flyover. As a result, the flyover creates many physiological problems to the residents in this buildings.

Facade of No.17 & 19, Kowloon City Road

Row of buildings of the same type

Residents' adaptations

Physiological Impact

This building was chosen for the investigation of the effects the flyover has on the residents. Interviews were conducted and datas were collected at different levels of the building: 2nd floor (the level right underneath the flyover), 3rd floor (the level right next to the flyover), the roof (10th floor).

Noise level:
Noise pollution is most serious on the floor right next to flyover. The maxium level can reach 83dB. The fact that the flyover serves high-speed traffic make the level even higher than that on the street.

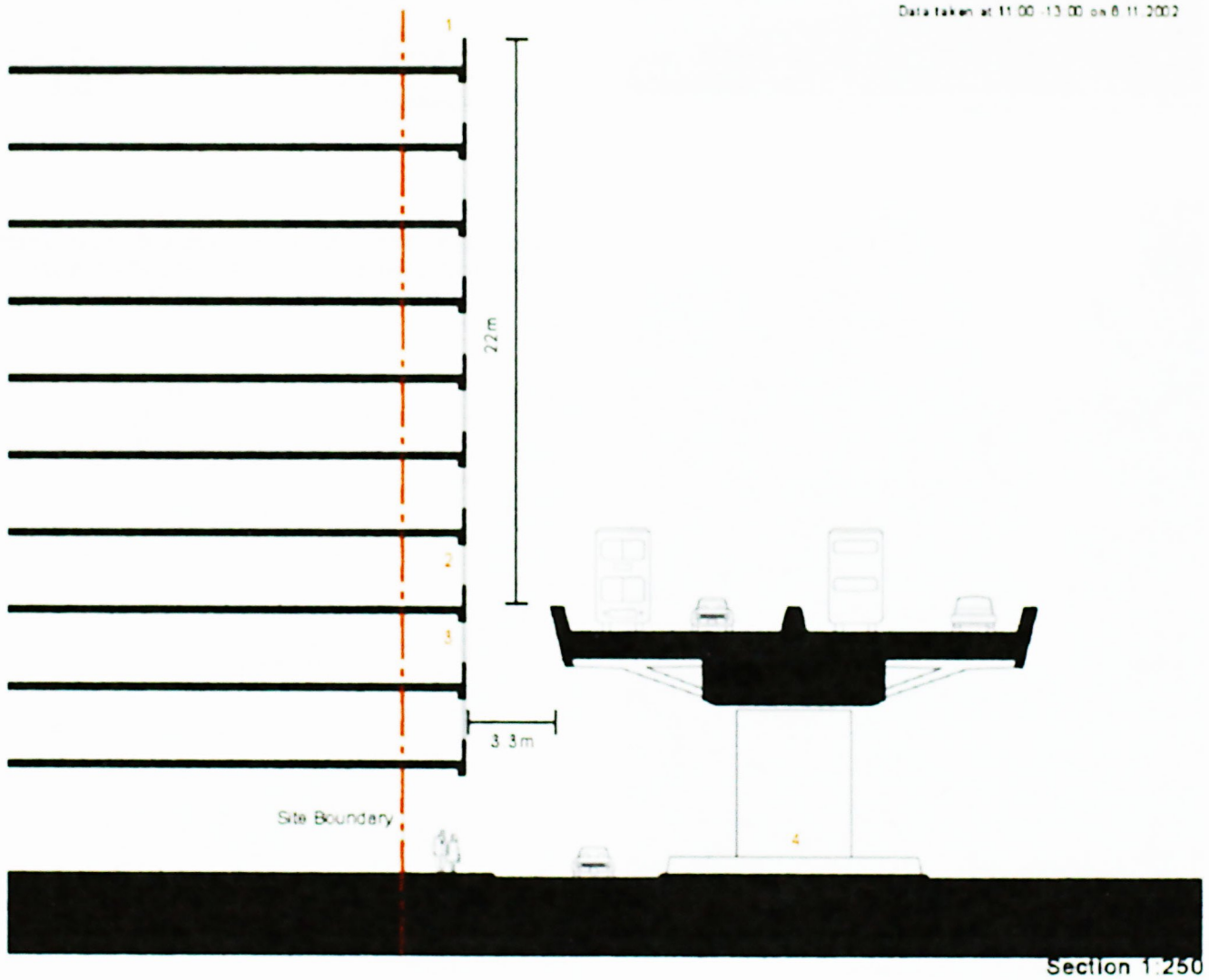
CO2 level:
Air pollution is again most serious on the floor right next to flyover. The CO2 level can reach 880ppm. The CO2 level at the floor right underneath the flyover is comparable to that on the street.

Light level:
The light level is found acceptable even in the floor right underneath the flyover. One account for this is the sun angle is high enough to penetrate into the flat by the time of visit (11:00am). However there are complaints from the residentson the light level during other times on the day.

Conclusion:
- Both air and noise pollution are the worst at the level right next to the flyover. Habitation space is not recommended at this level.

- At the level higher than 22m, it can be assumed that the flyover will have very limited effect on the environmental factors.

- The present distance between the building and flyover (3.3m) still allow acceptable daylight to the space in the building of approximately 3m below the flyover.



Section 1:250

Data on noise, CO2 and light levels:

Point 1 - Roof (10th Floor)
Noise Level: 62dB-67dB
CO2 Level: 282ppm
Light Level 8300lux

Point 2 - 3rd Floor
Noise Level: 68dB-83dB
CO2 Level: 680ppm
Light Level 6000lux

Point 3 - 2nd Floor
Noise Level: 68dB-75dB
CO2 Level: 533ppm
Light Level 4000lux

Point 4 - Street Level
Noise Level: 76dB-80dB
CO2 Level: 510ppm
Light Level 1100lux

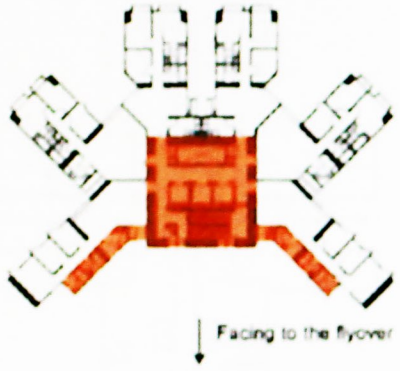
Data taken at 11:00 -13:00 on 8.11.2002


View from the Bedroom in No.17 2nd floor

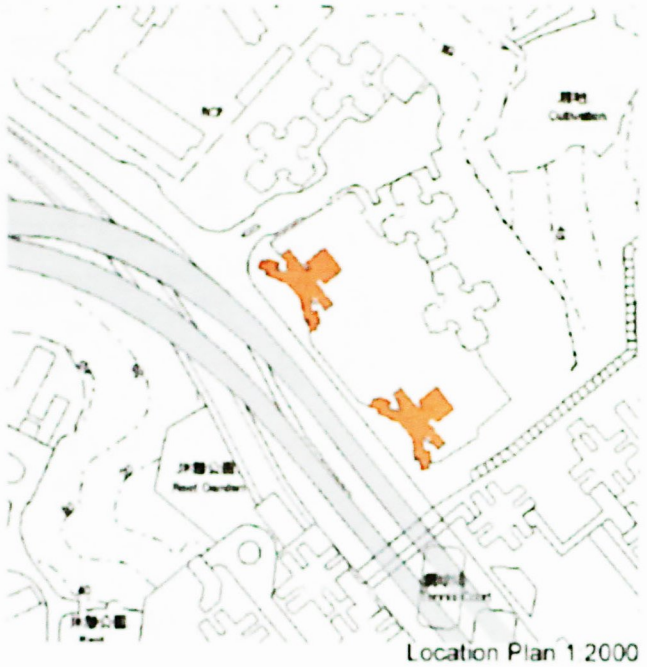

View from the Bedroom in No.19 3rd floor

Lei On Court - Lam Tin

This building was built after the construction of the flyover. The internal layout of the residential blocks is designed to reduce the undesirable effects caused by the highway. The service core (toilet, kitchen) and the lift core are located on one side to face the flyover while the living rooms and the bedrooms are on the other side. The service core and the lift core act as a layer to screen the physiological impact caused by the flyover to the residents. However, the facade face to the flyover looks lifeless in driver's perspective.



Typical Floor Plan

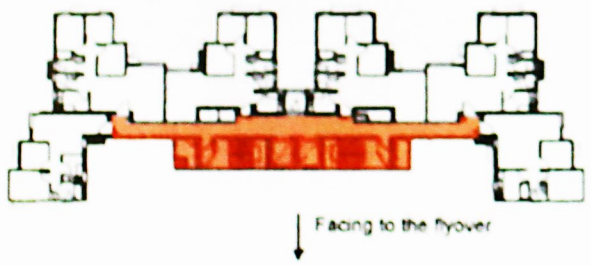


Location Plan 1:2000

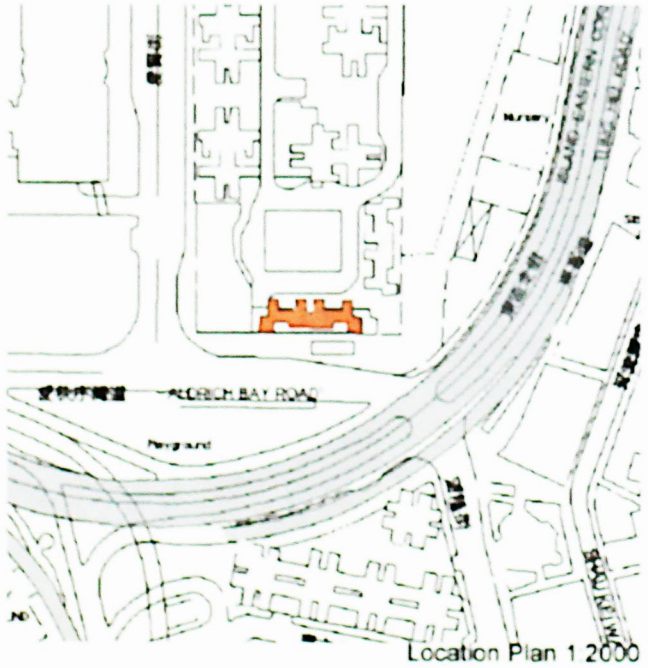
Service spaces facing flyover in front

Aldrich Garden - Aldrich Bay

This building was built after the construction of the Island Eastern Corridor. It is designed to reduced the physiological impact caused by the flyover. Lift core and corridor are located to face the flyover while most of the living units face to the open space on the other side. However, the facade face to the flyover is lifeless in driver's perspective.



Typical Floor Plan

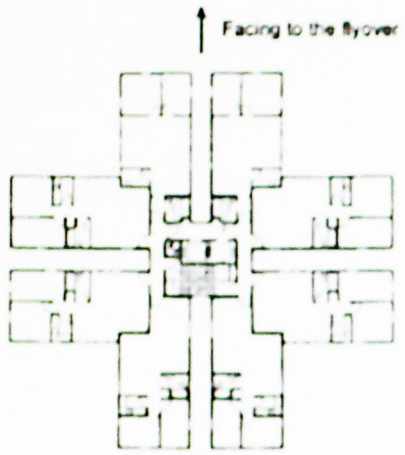


Location Plan 1:2000

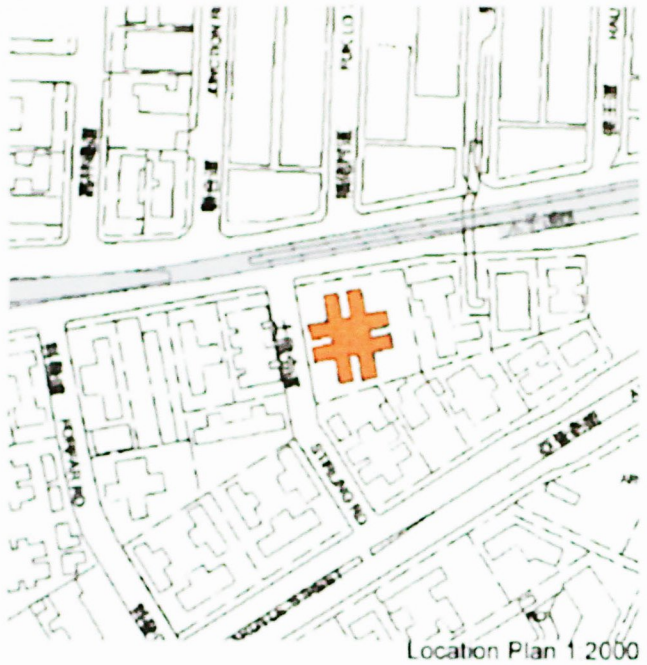
Service spaces facing flyover in front

Belvedere Heights - Kowloon City

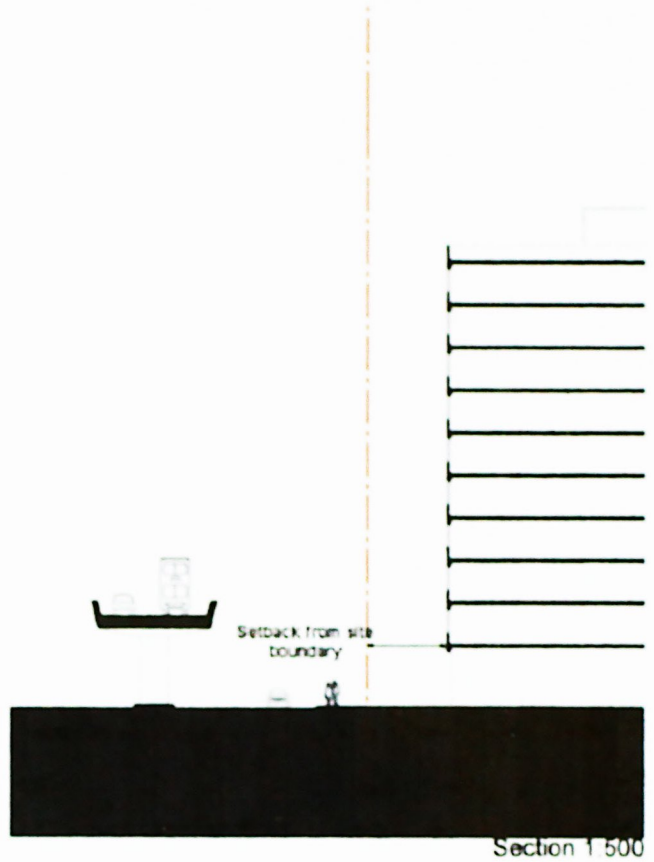
This building was built after the construction of the Prince Edward Road West Flyover. It is set back from the site boundary so that physiological impact caused by the flyover to the residents was reduced.



Typical Floor Plan



Location Plan 1:2000

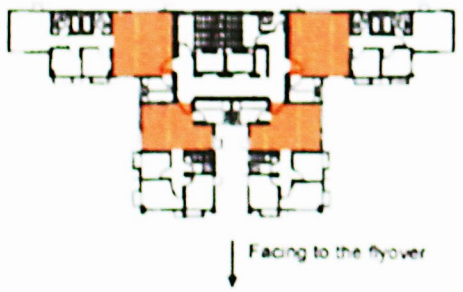


Section 1:500

The residential block is set back from the site boundary

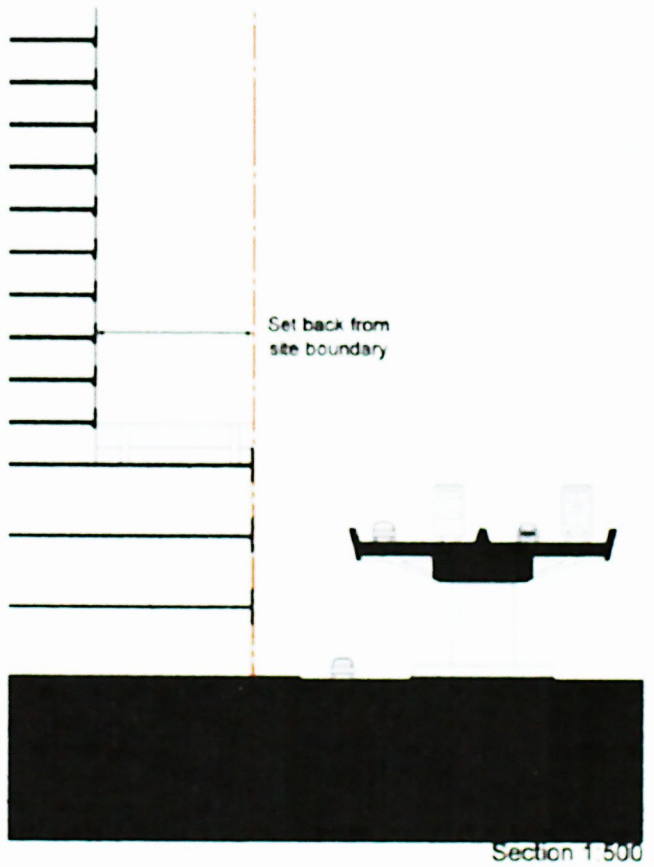
Harmony Garden - Ma Tau Wai

This building was built after the construction of the flyover. The buildings are designed to reduce the physiological impact caused by the flyover. There is a commercial podium 15m in height under the residential blocks. The residential units start in a higher level and therefore the undesirable effects caused by the flyover are reduced. The living areas in the residential units are also designed not to face to the flyover.



Typical Floor Plan

Location Plan 1:2000



Section 1:500

A podium under the residential blocks

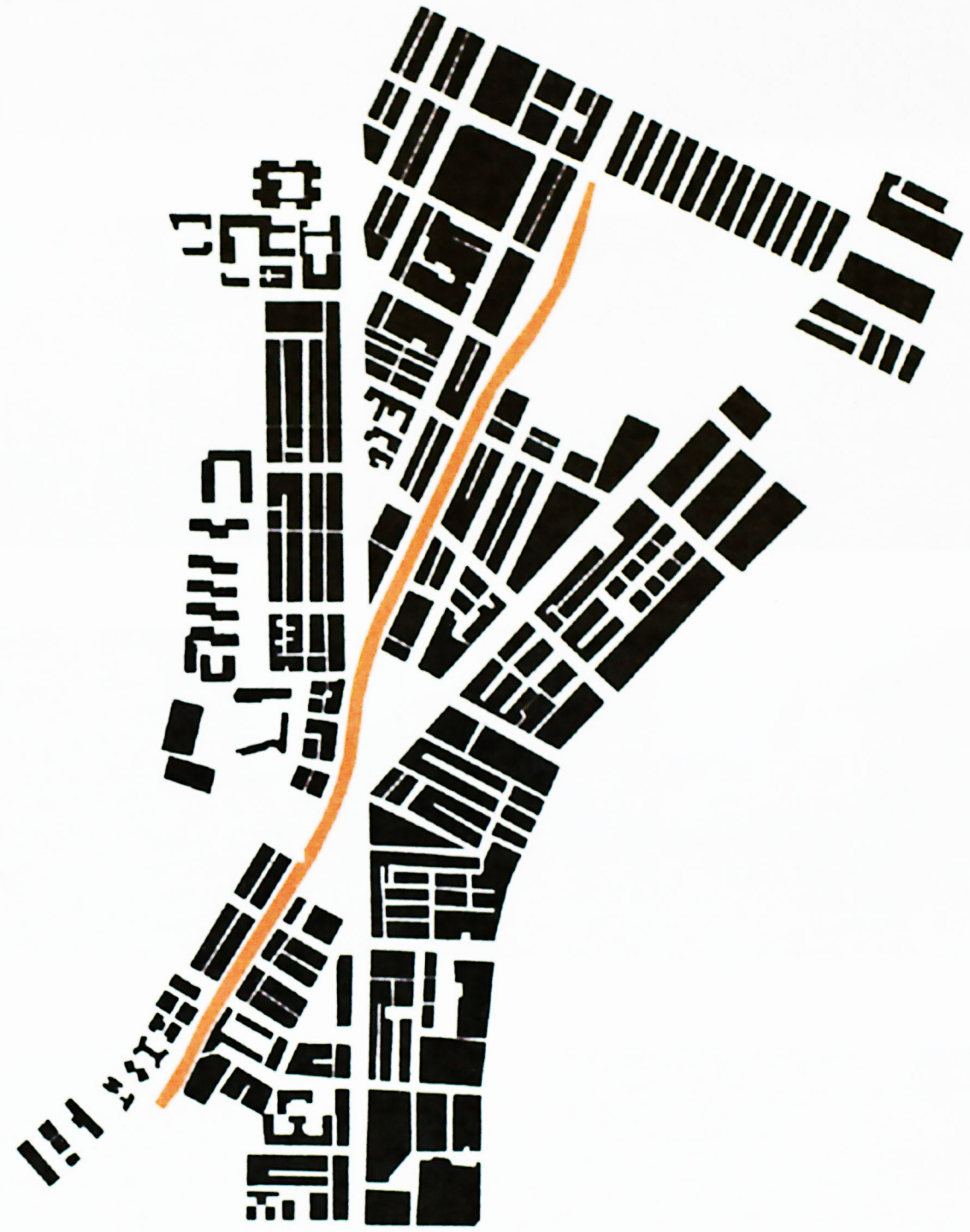
Drivers' Perspective

The Drivers' Perspective section will analyze the experience of drivers on the flyovers and account for different experiences on flyovers. It will also attempt to find out what make a place recognizable on flyovers and create a "sense of place" from the drivers' perspective.

In the beginning of this research, pictures were taken from drivers' perspective along some chosen flyovers through the urban areas in Hong Kong. We found that visual and spatial experiences are the two major experiences that mark a place from the drivers' perspective. So, the research will focus on the analysis of visual and spatial experiences of drivers and try to relate these experiences to physical qualities like position, height and design of buildings, so as to suggest guidelines for designing of buildings which address drivers' experience on flyovers.

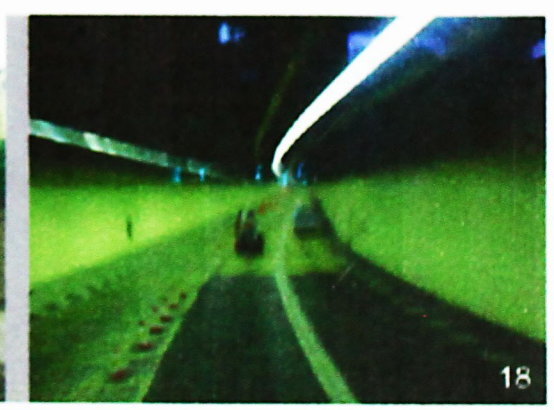
East Kowloon Corridor via Ma Tau Wai

Location Plan 1:8000

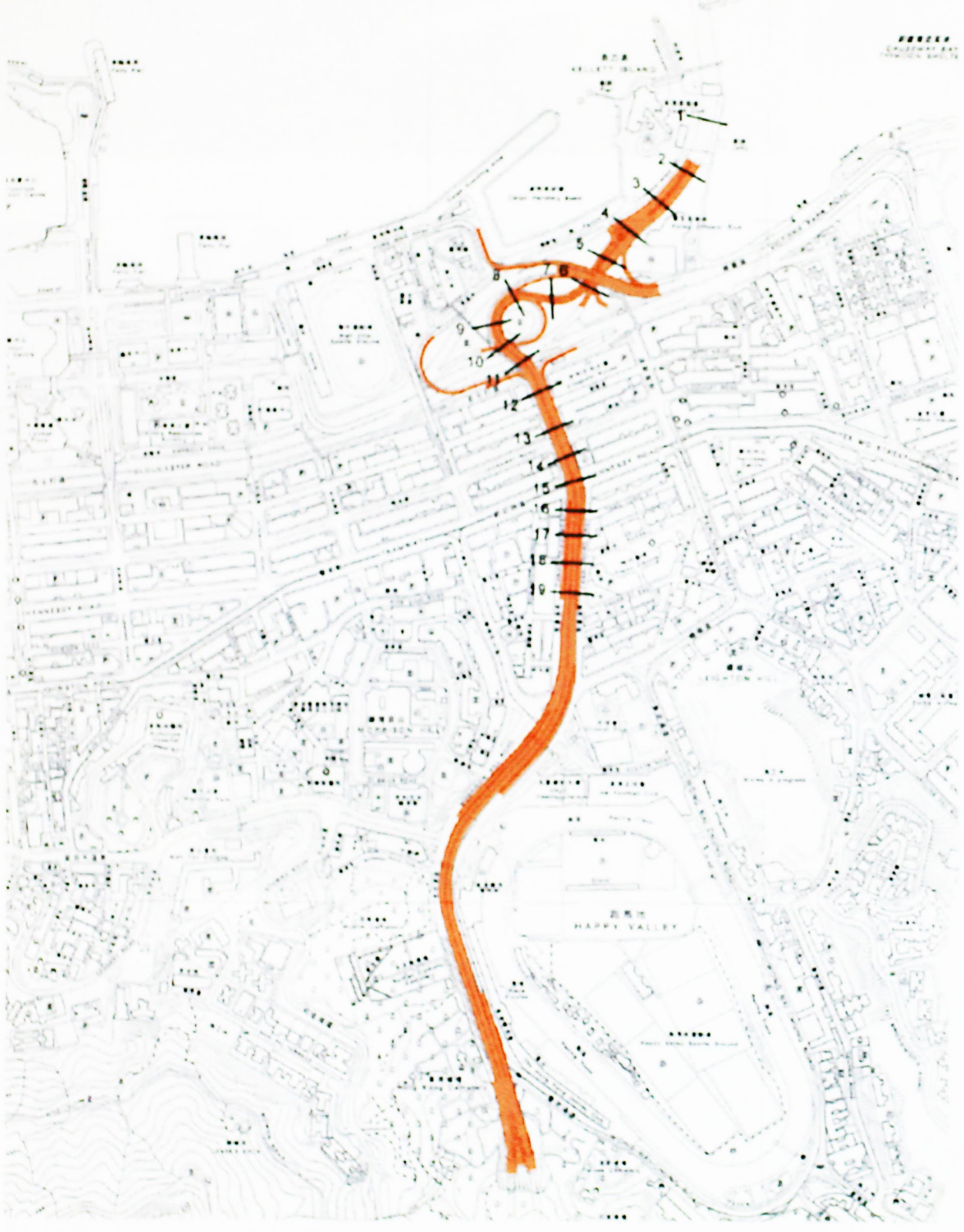


Spatial Experience

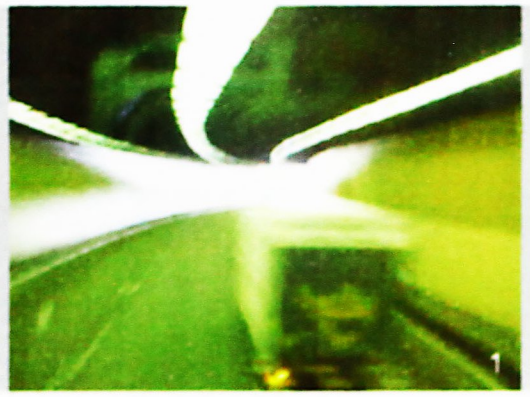
East Kowloon Corridor
via Ma Tau Wai



Canal Road Flyover via Causeway Bay



Canal Road Flyover
via Causeway Bay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West Kowloon Corridor via Yau Ma Tei

Location Plan 1:8000

Spatial Experience

West Kowloon Corridor
via Yau Ma Tei


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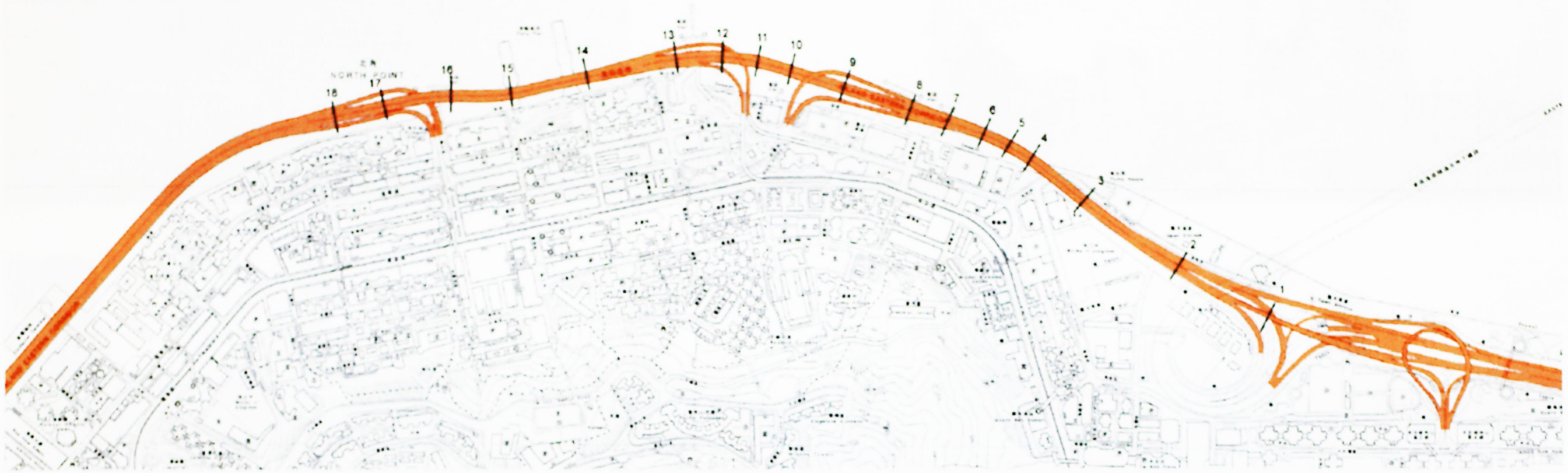
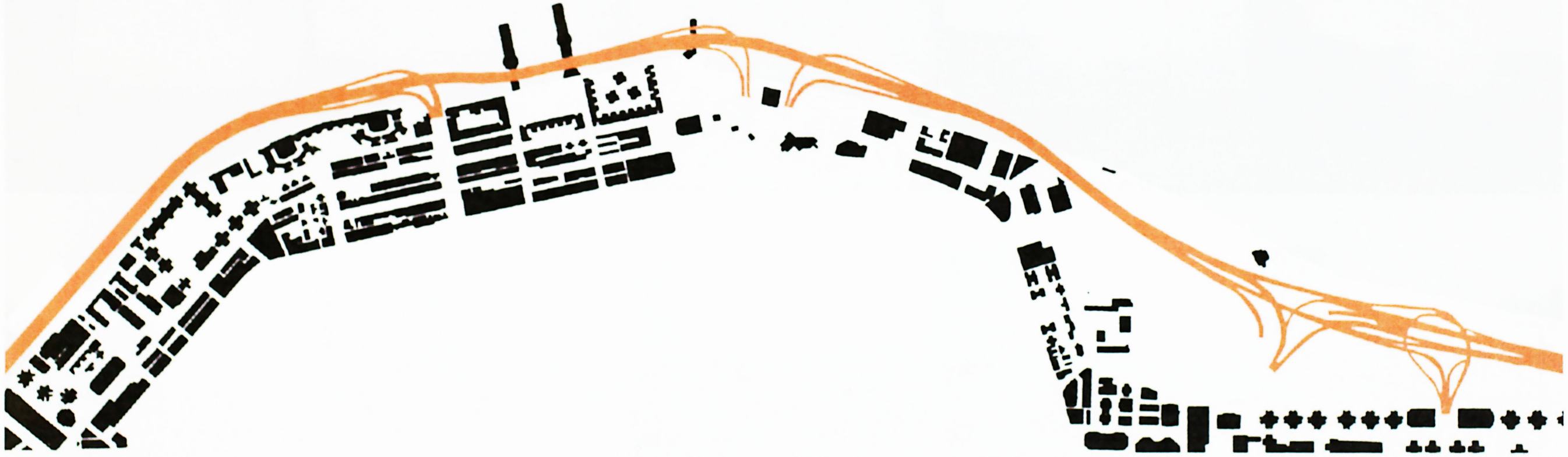
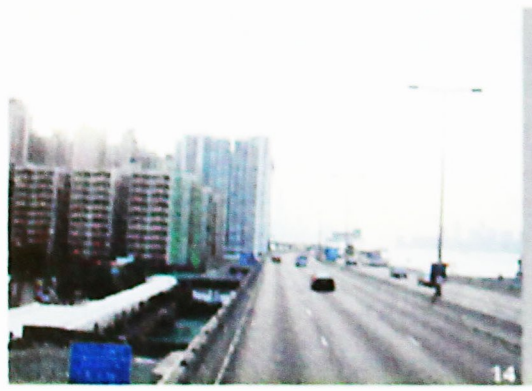
Drivers' Perspective - Drive Through Experience

Island Eastern Corridor via North Point



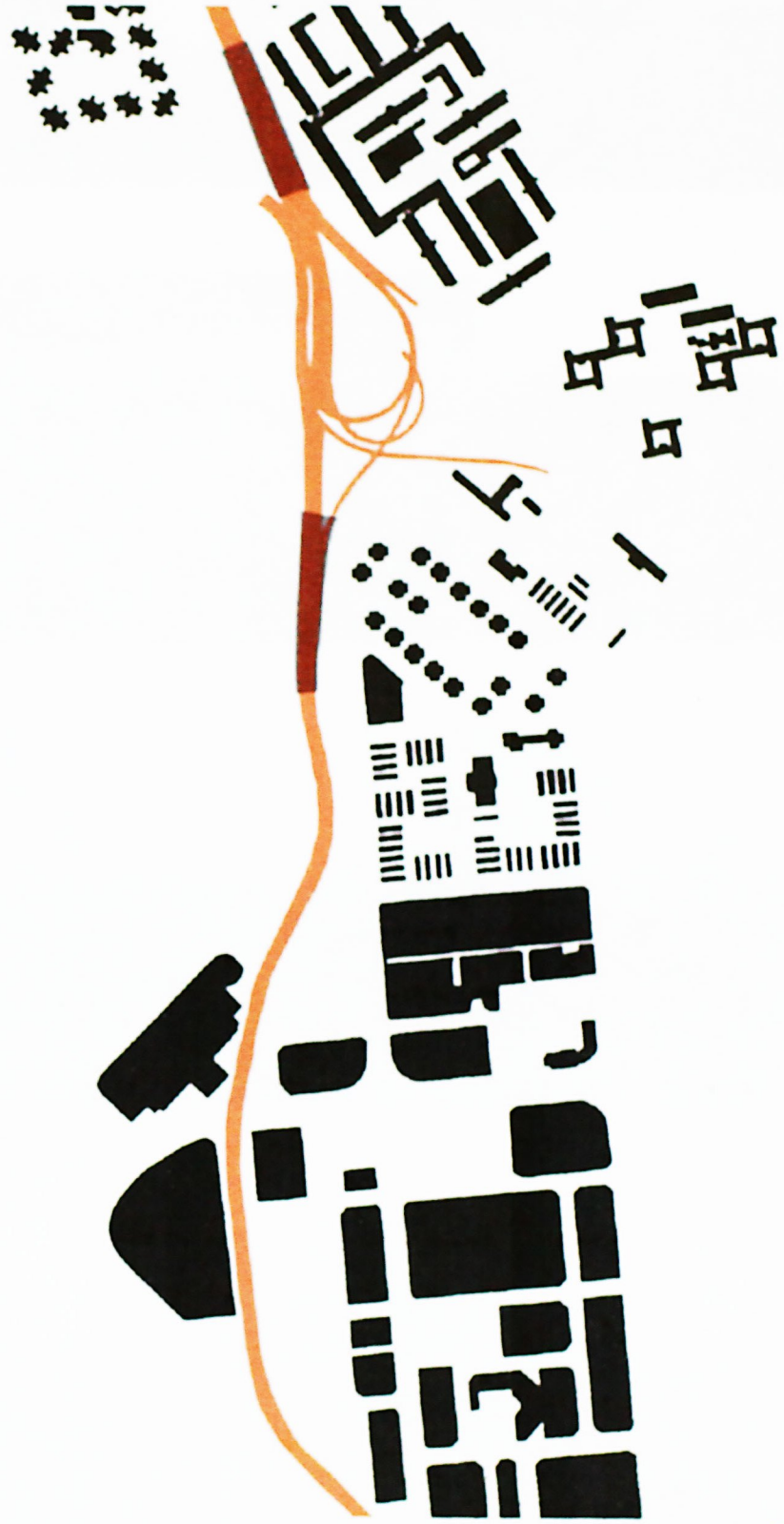


Island Eastern Corridor
via North Point



Kwun Tong Bypass via Kowloon Bay

Location Plan 1:8000



Spatial Experience

Kwun Tong Bypass
via Kowloon Bay


















The variety of spatial experiences is the reason why the driving experience through the urban areas in the city so enjoyable. Different spatial settings along the flyovers result in a sequence of contrasting spatial experiences for drivers.

The spatial experience on flyovers is mainly related to the feeling of confinement and openness on the flyovers. It is also related to structures that built over the flyovers, which result in an enclosed feeling when one drives through.

Confinement and Openness

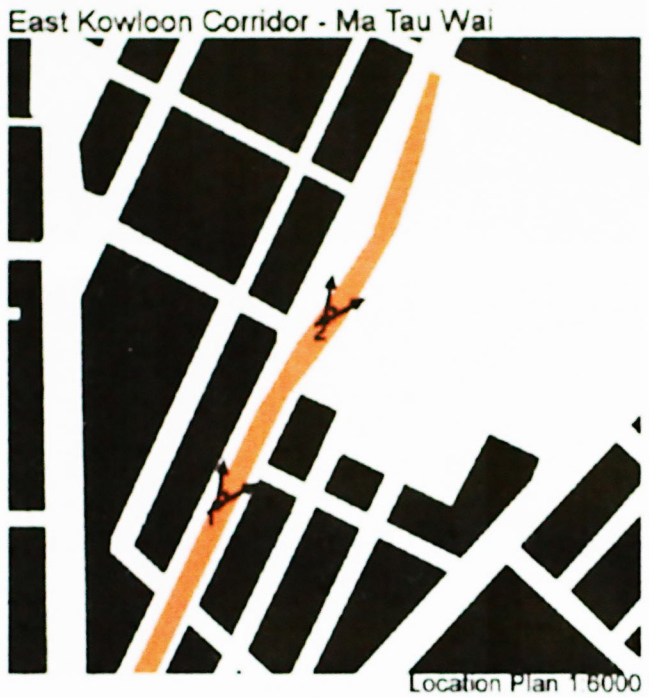
The spatial confinement is an important quality that characterizes a place on flyovers. Within the urban areas of the city, drivers on flyovers are in fact experiencing alternating feelings of confinement and openness. Each change in this feeling is a sign telling drivers that they are entering from one place to another.

Confinement and openness are like the two ends of a spectrum. There are different degrees of confinement depending on the distance of adjacent buildings from the flyover. Also sometimes one side is confined while the other side is much open.

As change in spatial confinement is a sign telling drivers that they are entering from one place to another, the degree of confinement has to do with the strength of this signal, The more dramatic the change in spatial confinement, the stronger the signal to drivers.

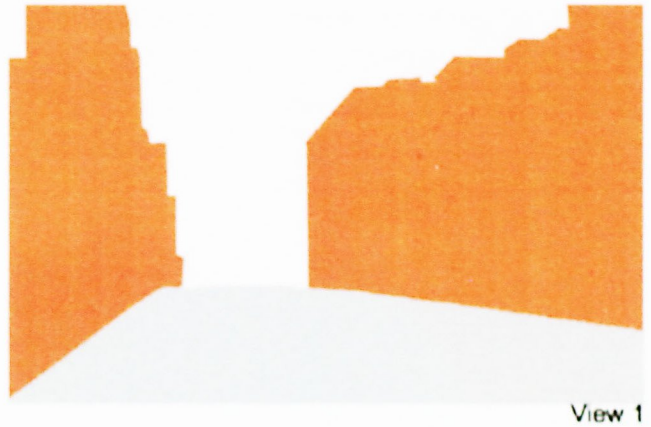
Drivers are more likely to remember or notice different places on flyovers with dramatic changes of spatial confinement along than on those with all similar spatial confinement along.

East Kowloon Corridor - Ma Tau Wai



Location Plan 1:6000

View 1

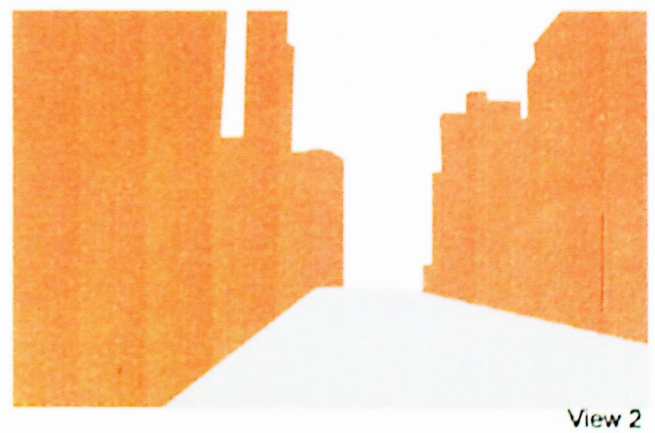


View 2

Canal Road Flyover - Causeway Bay

Location plan 1:6000

View 1



View 2

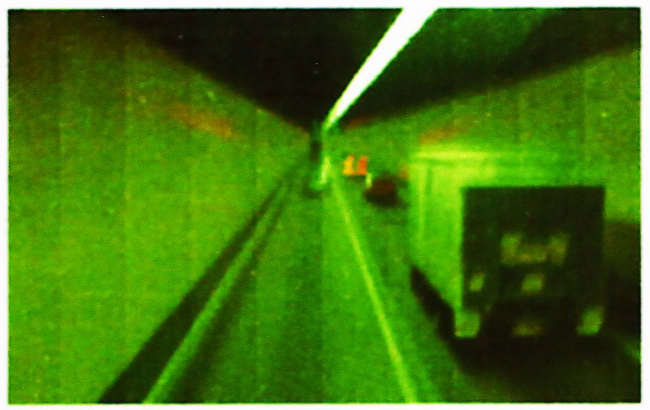
Passing through structures built over:

Passing through structures built over is another spatial experience that catches drivers' attention. It includes longer experience like driving through tunnels, sound barriers, or shorter experience like passing under another flyovers running perpendicularly or even just a road sign.

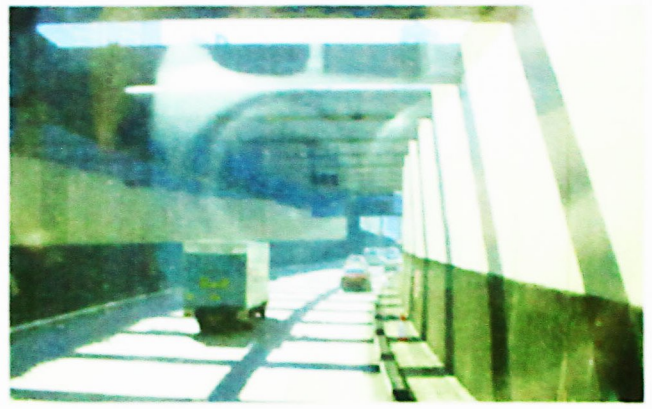
For longer passing through experience, it is better to have the sides opened so that drivers can still have views. There can be a transitional zone from dark tunnel to outside and vice versa, as in the case of harbour crossing tunnel.

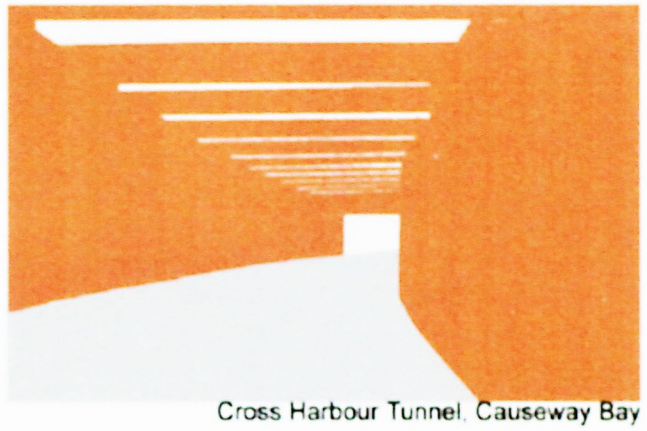
A short passing through experience gives a sudden period of darkness to drivers. The structure that drivers pass through has the physical setting of being a gateway to a place.

No matter the duration of passing through, the surfaces of the structures where vehicles enter are very prominent to drivers. Articulations can be made on those surfaces.

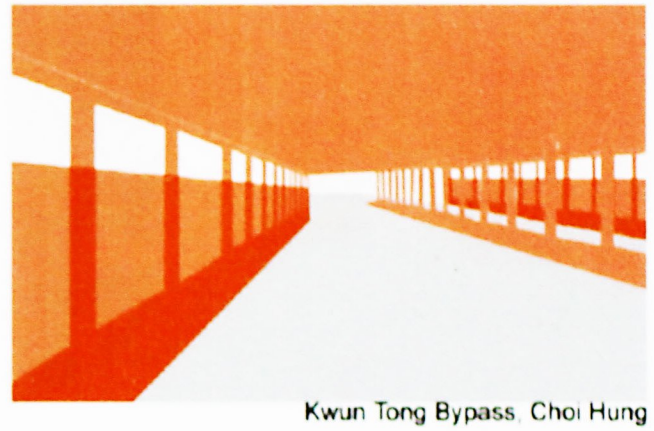


Cross Harbour Tunnel, Causeway Bay

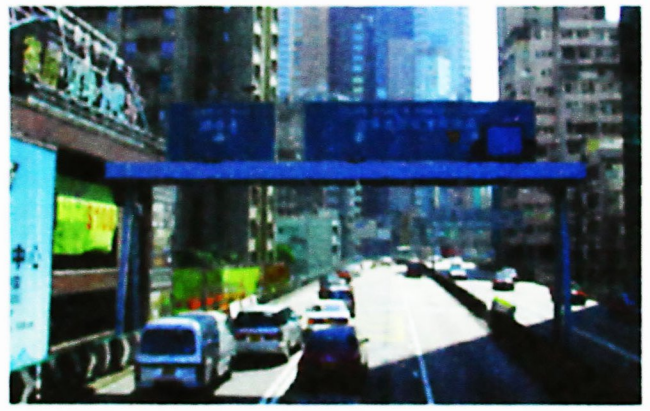




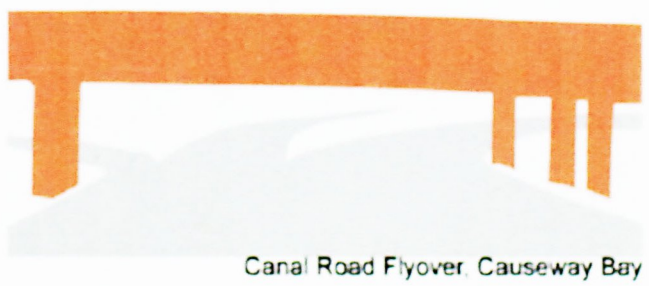
Cross Harbour Tunnel, Causeway Bay



Kwun Tong Bypass, Choi Hung



Canal Road Flyover, Causeway Bay



Canal Road Flyover, Causeway Bay

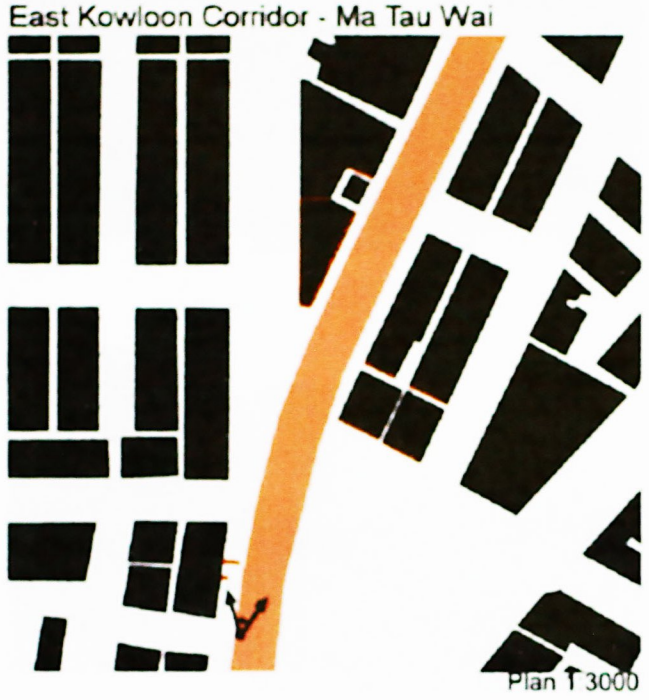
East Kowloon Corridor, Ma Tau Wai

The visual experience section focuses on finding surfaces that catch drivers' attention on flyovers and their causes for being prominent. We came up with four major conditions where certain surfaces will become prominent to drivers.

1. Surfaces facing an open space next to flyover
2. Surfaces exposed because of projections or setbacks
3. Surfaces exposed because of height difference
4. Surfaces exposed because of turning effect of flyover

It is important to note that there are little cases where anyone of these conditions happens by itself. The scene of the city as seen from drivers on flyover is normally a mix of all four conditions.

East Kowloon Corridor - Ma Tau Wai



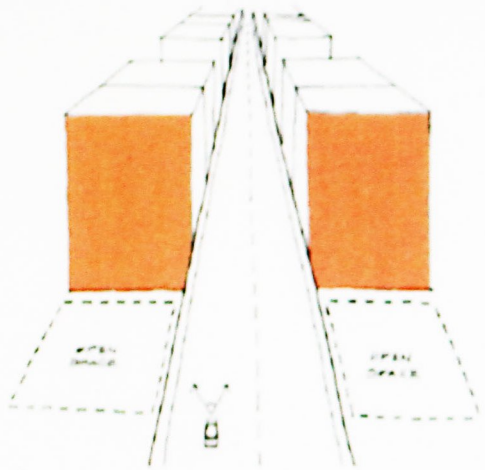
Plan 1:3000

Canal Road Flyover - Causeway Bay

Plan 1:3000

Surfaces facing an open space next to flyover:

They are usually the surfaces before a change in spatial experience happens, from an open to a confined space. So they are often important surface that marks the entrance to the dense city on the flyovers.

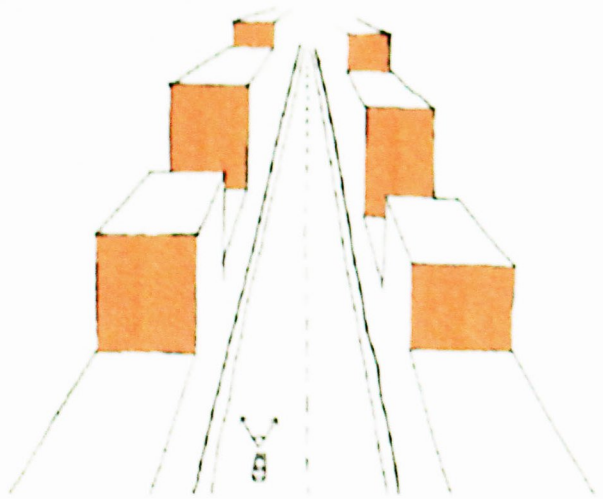


East Kowloon Corridor, Ma Tau Wai

Island Eastern Corridor, North Point

Surface exposed because of height difference:

They are normally more prominent to drivers from farther away than to those close to them. They can catch the attention of drivers from farther away.

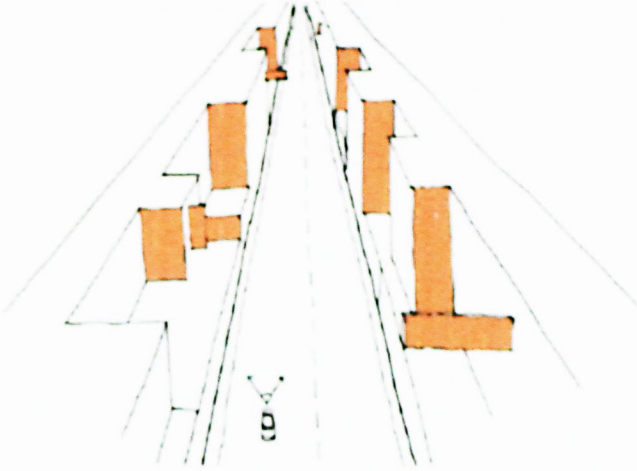


East Kowloon Corridor, Ma Tau Wai

East Kowloon Corridor, Ma Tau Wai

Surface exposed because of projections or setbacks:

They appear as perpendicular surfaces on the two sides of the flyovers. Many of them are at similar level as the flyover, so they are close and can be seen clearly by drivers. A lot of these surfaces are presently used for advertising.

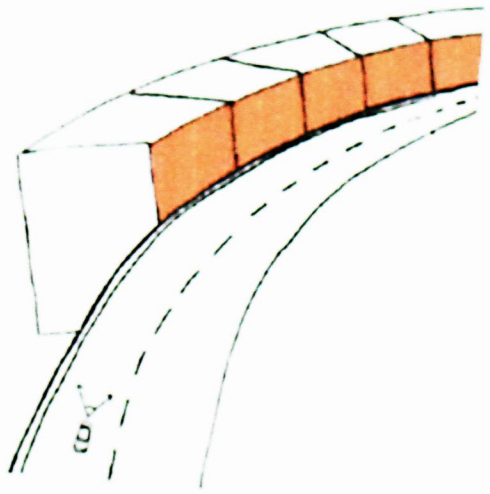


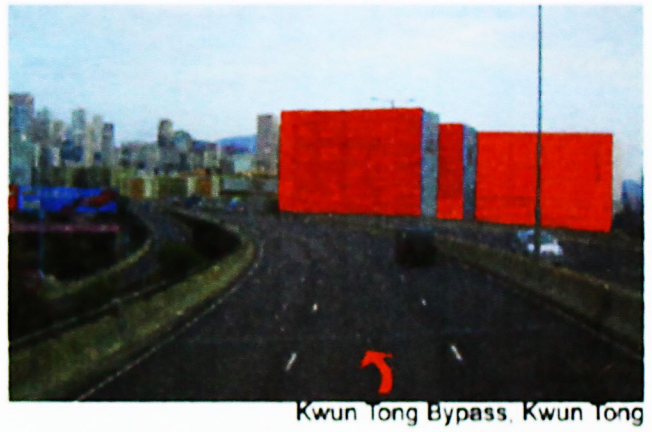
Canal Road Flyover, Causeway Bay

East Kowloon Corridor, Ma Tau Wai

Surface exposed because of turning effect of flyover:

While the surfaces in the three other cases are perpendicular to the flyover, the surface here is parallel to the flyover. They are situated at the turning points of the flyover, and thus are very prominent to the drivers driving towards the turning points. They are again more prominent to drivers from farther away than to those close to them.





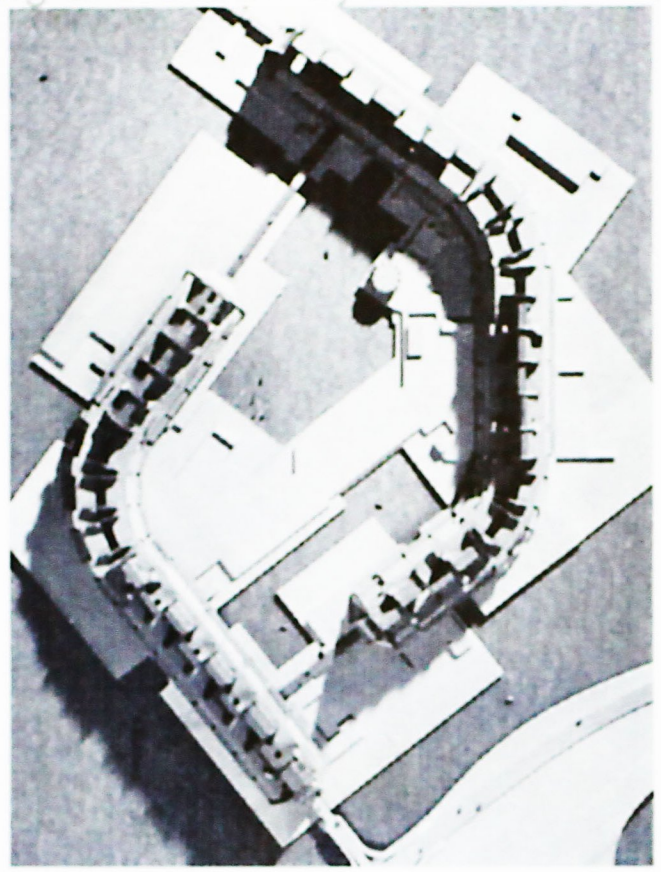
Kwun Tong Bypass, Kwun Tong

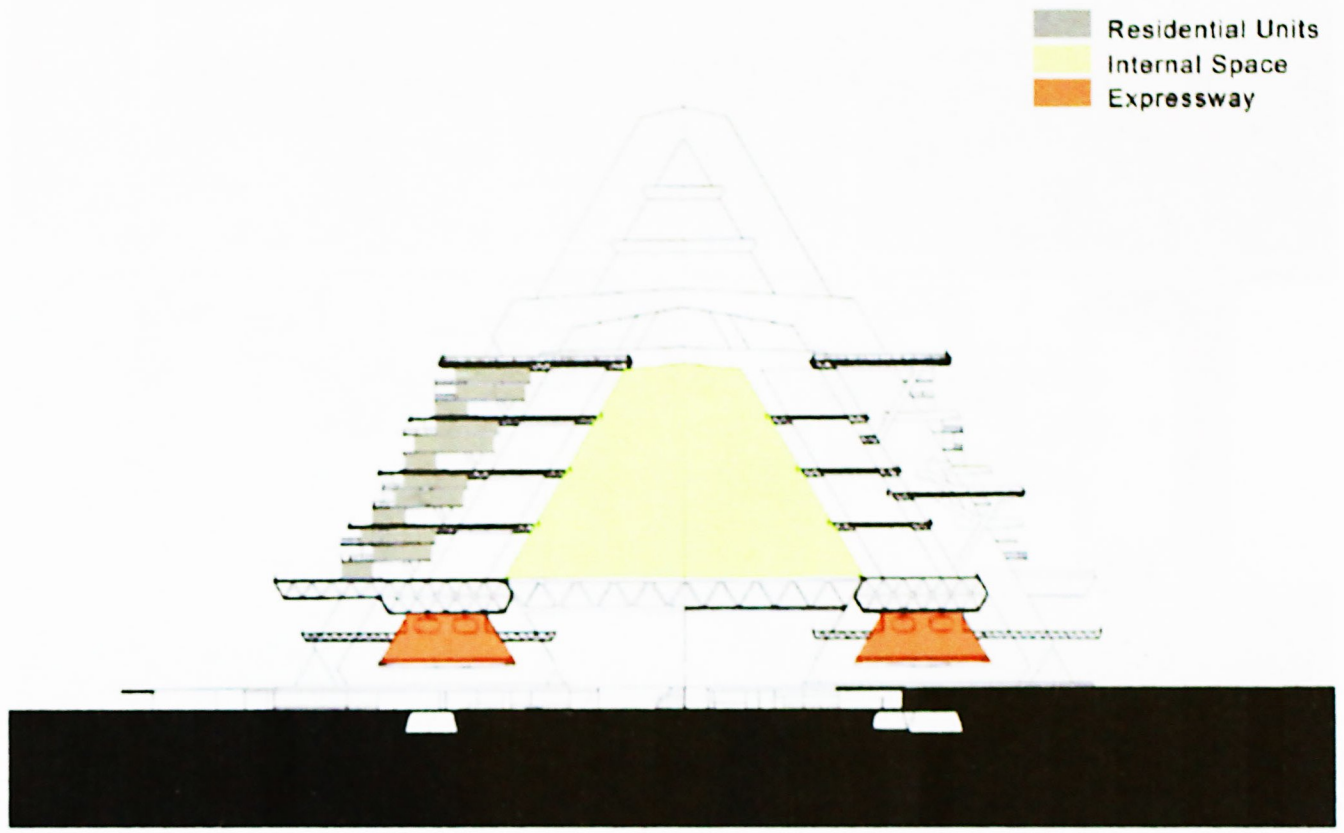
Kwun Tong Bypass, Kwun Tong

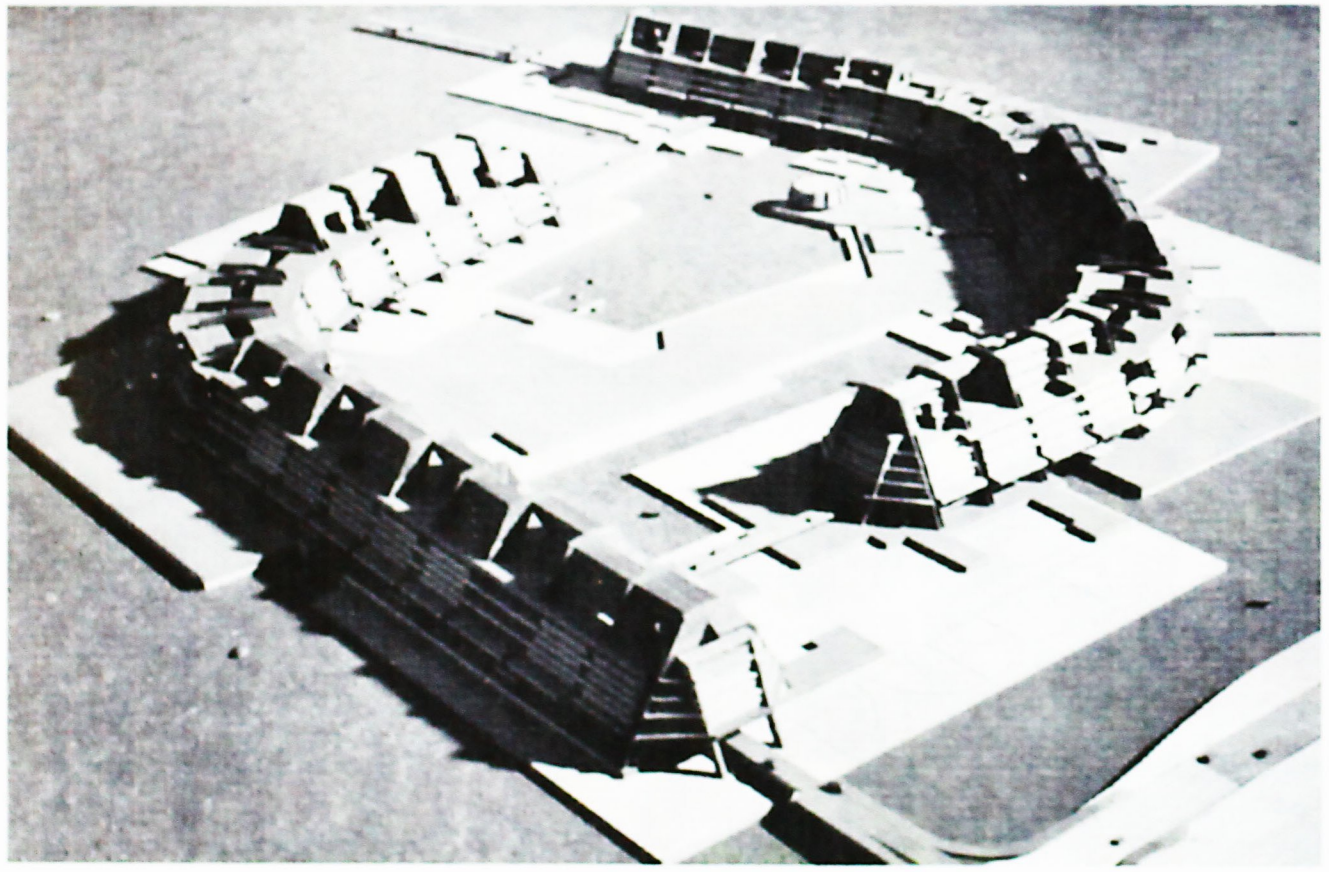
iii. Precedent Study

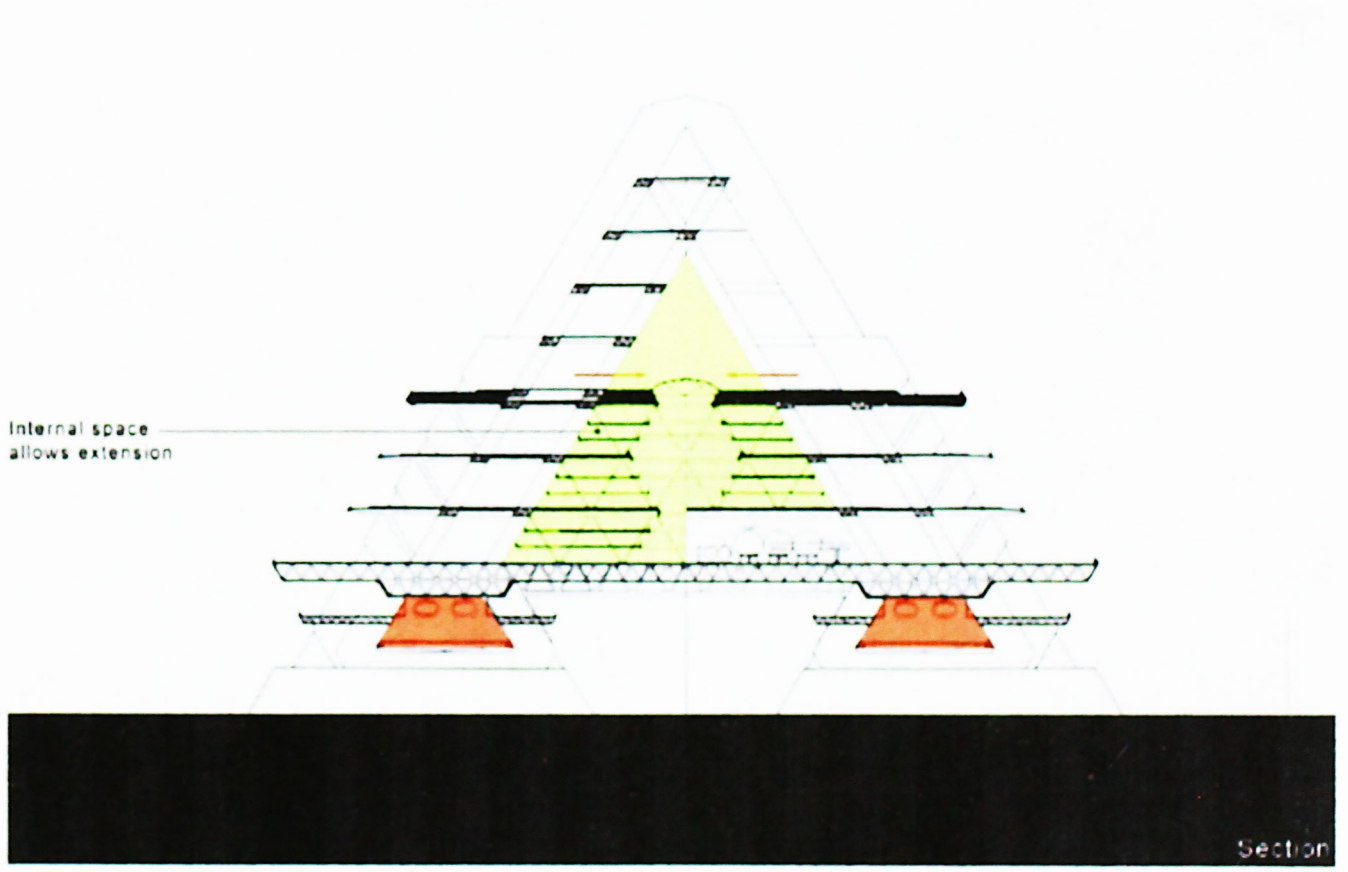
Precedent Study - Restructuring the Urban System - Plan for a Residential Unit 1959, Kenzo Tange

Major Characteristics:
- A residential unit for 25,000 people
- Residential block as continuous terrace complex each encloses an interior space
- The flats are given large balconies because of the terrace organization and opened to light on both sides
- The interior space can enclose community and sports facilities, shops and offices etc
- Living and community facilities are brought into intimate contact with each other
- The road and building are not treated as two systems but integrated in one complex







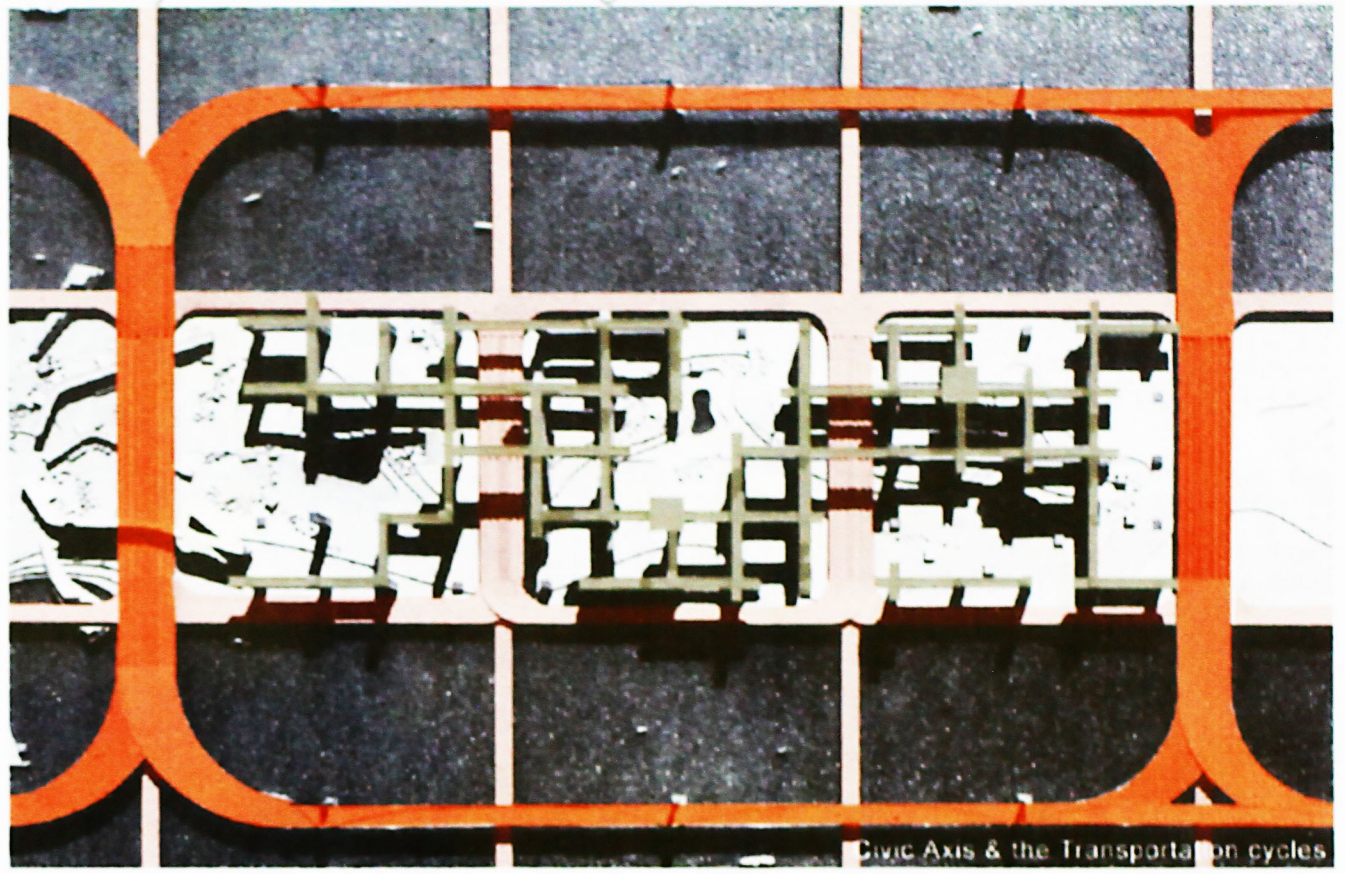


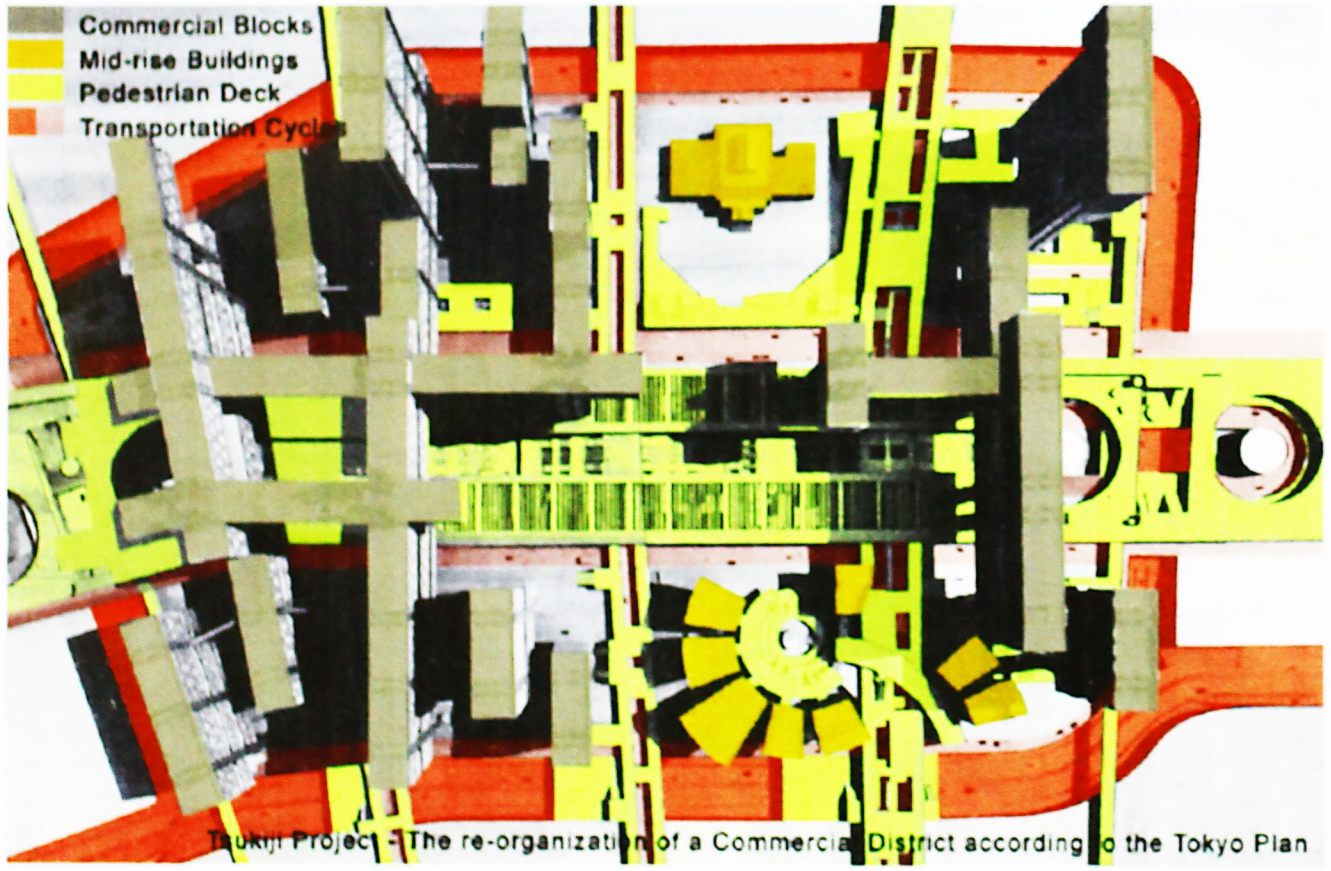
Precedent Study - Restructuring the Urban System - A Plan for Tokyo 1960, Kenzo Tange

Thanks to the coming of automobile, there is a need for a new order in which a vehicle can move from a fast highway to a slower one and then come to a stop at the destination. ...The problem raised by automobile traffic require that we discover a means for bringing the city structure, the traffic system and the architecture together into an organic whole.".
"Today, however, huge higways carrying high speed traffic have intruded themselves into the old system. They represent a superhuman scale which in no way harmonizes with the architecture of the late 19th century and the first half of the 20th century". Kenzo Tange

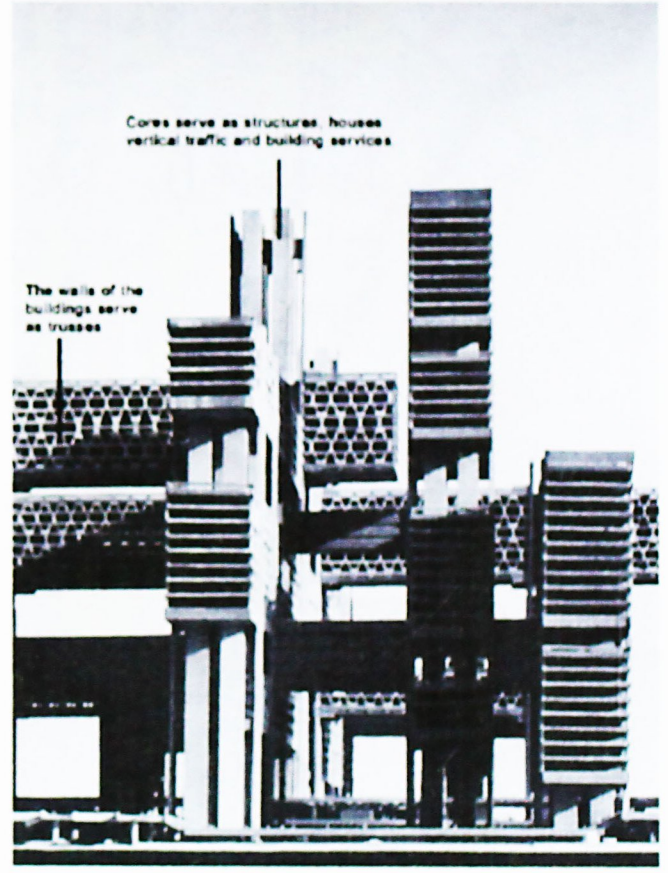
Major Characteristics
- A plan for a city with a population more than 10,000,000
- A linear pattern of urban development was proposed in opposition to the traditional radial centripedal pattern. A civic axis was introduced with residential areas developed perpendicular to it.
- A three-level cyclical transportation system is proposed around the civic axis to bring about fast vehicular transportation.
- The civic axis together with the cyclical transportation system become the stage for life in a moving city and the symbol of urban living.
- Pilotis to raised buildings above ground.
- New large scale structures which have long life cycles are proposed to respond to the traffic systems and become the major framework of the city.
- Human scale is kept in lower platforms where there are pedestrianized streets, shops, plaza etc.

Overall Plan


Civic Axis & the Transportation cycles



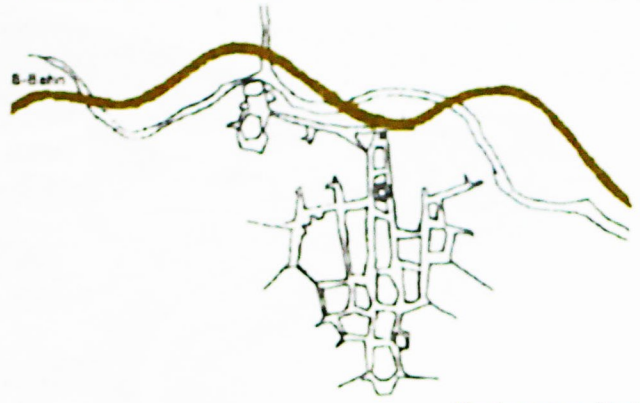
Tsukiji Project - The re-organization of a Commercial District according to the Tokyo Plan



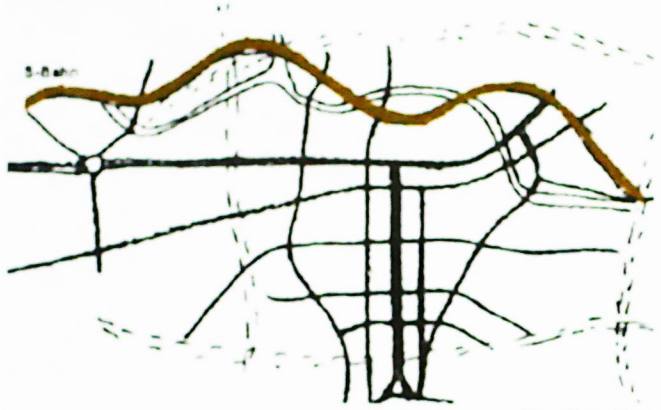
Precedent Study - Urban Infrastructure - Berlin Plan 1958, P. Smithson & P. Sigmond, Team 10

" This is a city in which every function has its own formal equivalent which is at once recognizable for what it is. Its organization is not rigid. The attempt has been made to create an open aesthetic, capable of variation and growth, in which change of social objectives can find an outlet.", P. Smithson

Major Characteristics:
- The overlaying of a rectangular traffic net and an angular pedestrian platform.
- The two systems are connected by escalators at points where they intersect.
- Distinction of road types within the traffic net.
- The angular pedestrian platform serves as commercial, retail or entertainment facilities. (e.g. cinemas, markets, trade centres.)
- High buildings as towers for administration of big shops, hotel, integrate with the platform.
- High buildings as big linear volumes for business admin istration are placed on the periphery to "ring" the plea sure city.



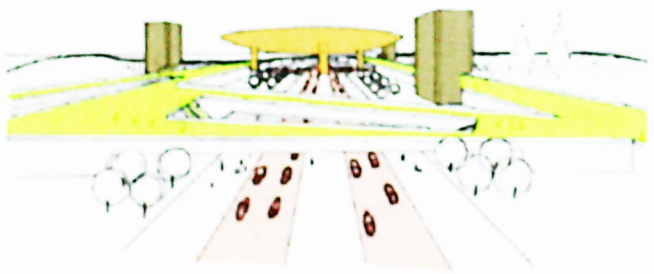
Pedestrian Net



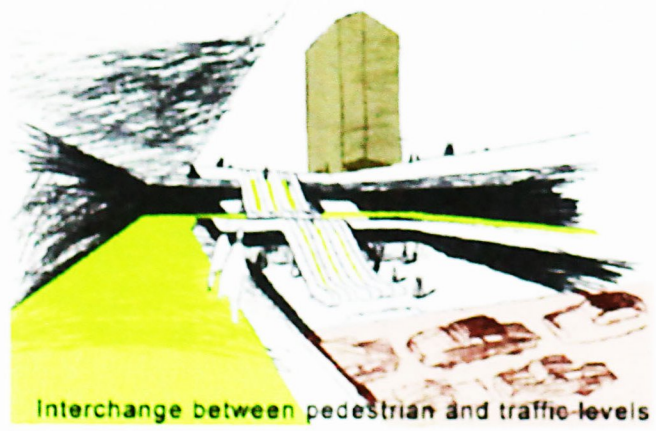
Traffic Net

Urban motorways
Roads which are given additional symbolic importance
Through roads with 4-hr parking
General purpose roads
Single purpose roads

Distinction of Road Types



Perspective



Interchange between pedestrian and traffic levels

Layers of physical elements

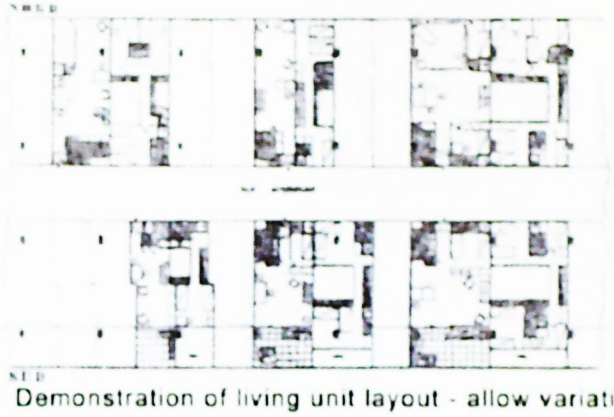
Precedent Study - Inhabited Highways - Plan for Algiers, Le Corbusier, 1930-39

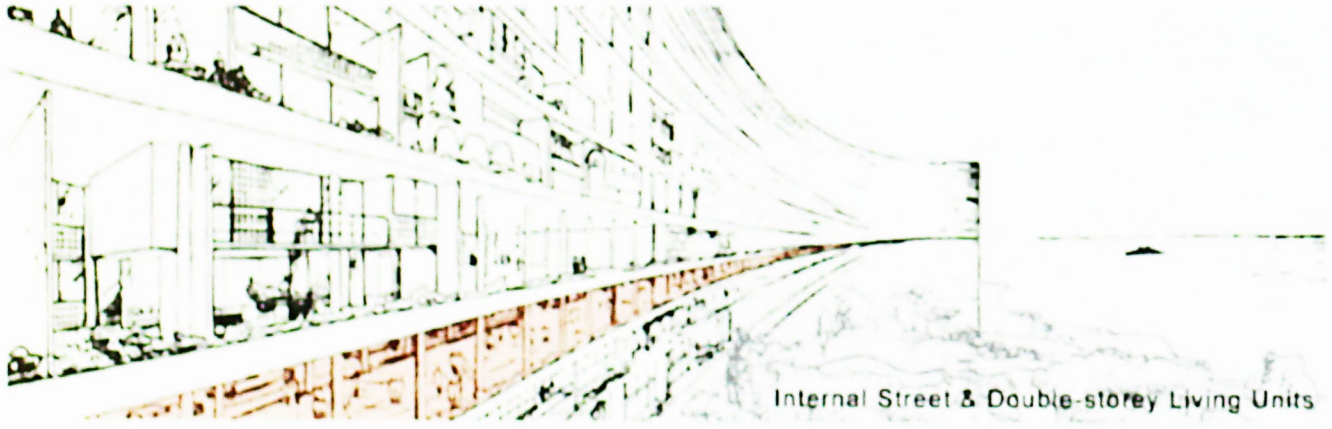
"The entire site begins to speak, of the water, of the land, of the air; it speaks architecture. This discourse is a poem of human geometry and an immense fantasy of nature. The eye sees two things: nature and the product of human labor. The city announces itself by a line which alone, is capable of harmonizing with the violent caprice of the mountains: the horizontal.", Le Corbusier, describing the concept of inhabited highways for the project for Rio de Janerio, the predecessor of the project for Algiers.

Major Characteristics:
- The project is composed of 3 main parts, the Fort-l'Empereur, the Coastline freeway, and the Water front business Center. (see overall plan below)
- Residential units below elevated highways.
- The units are to be designed according to the owner's predilection.
- The units enjoy enormous view to the water without being affected by noise, air and visual pollution from traffic.
- The highway block is elvated to clear the ground plane as open space.

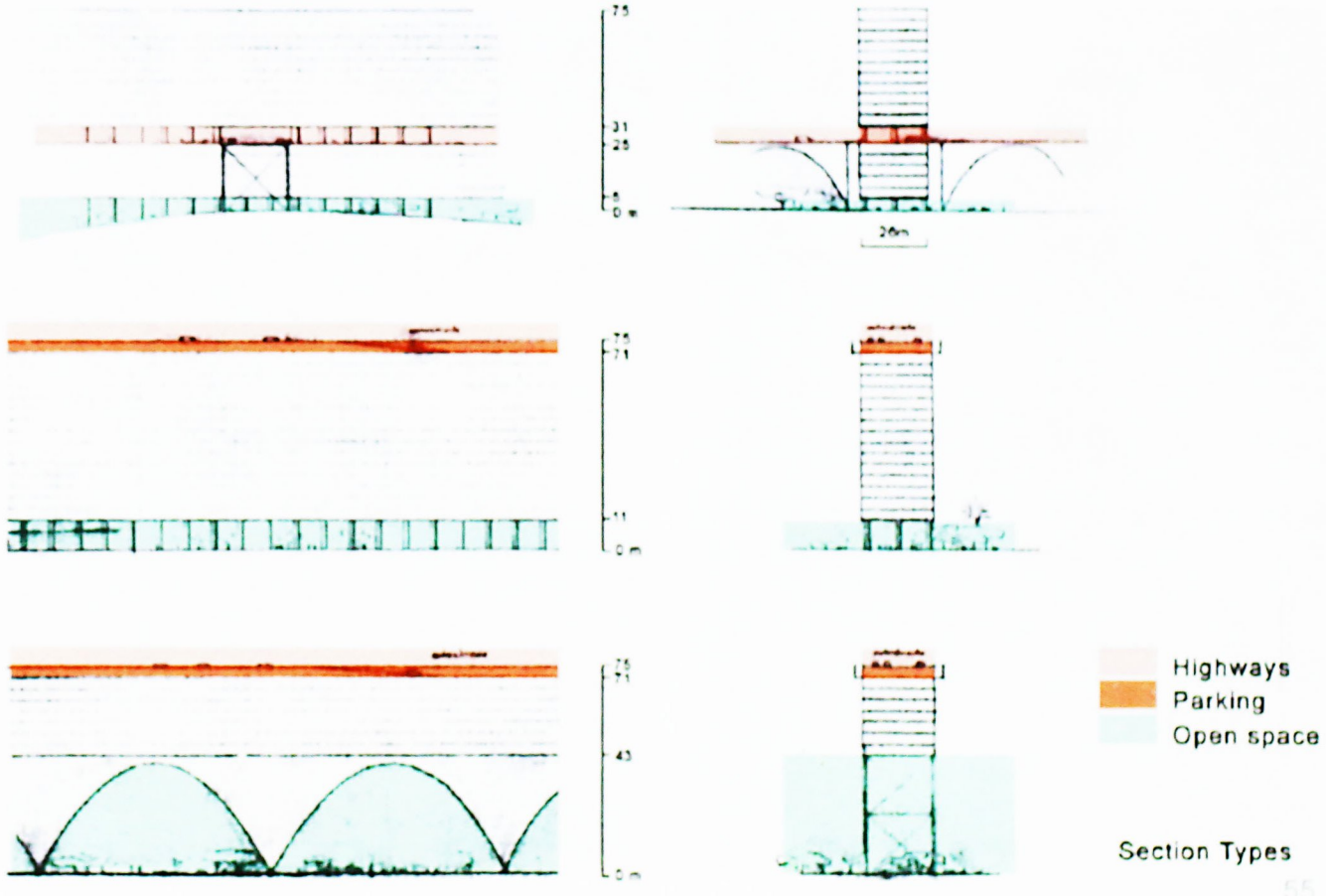

Seascraper

Highways on the Top Floor


Demonstration of living unit layout - allow variation


Internal Street & Double-storey Living Units

Overal Plan



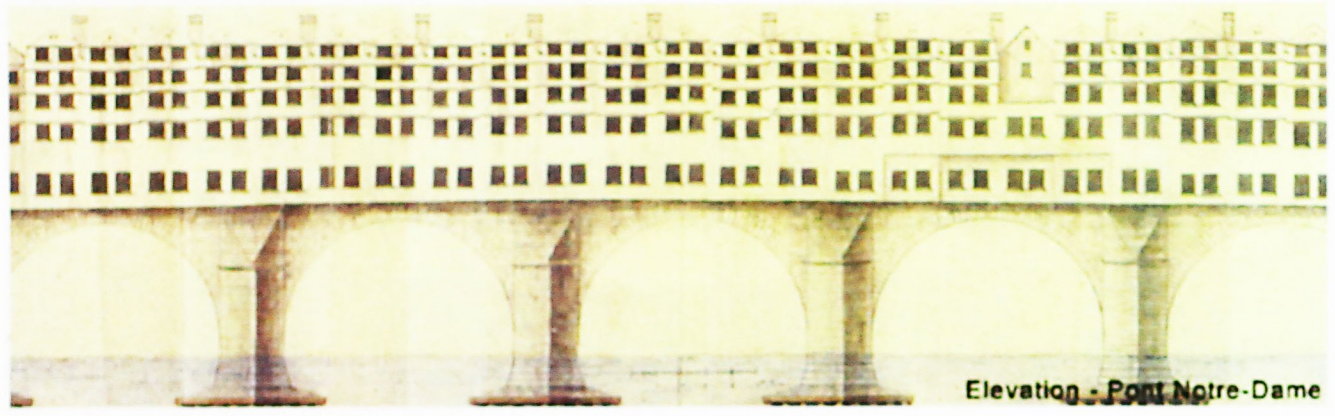
Section Types

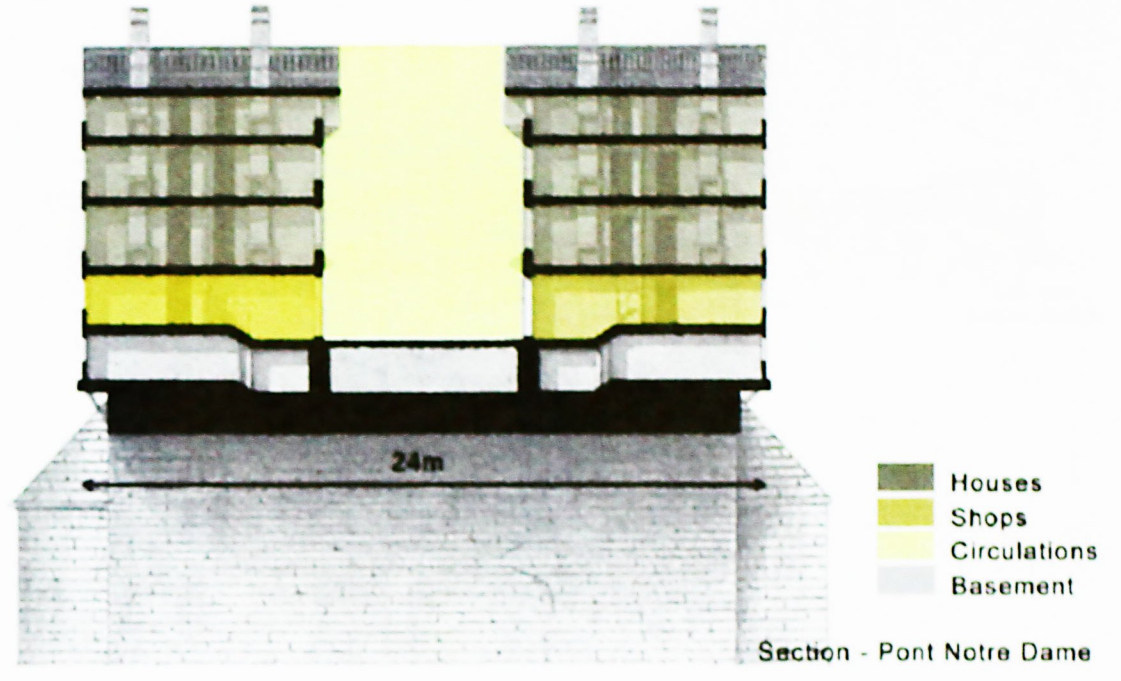
Precedent Study - Inhabited Bridge - Medieval Times

The Pont Notre-Dame, Paris, 1414

Major Characteristics:
- The bridge is 124m long and 24m wide and supported two rows of 34 houses.
- Ground floor of the houses are shops with window facade.
- The bridge was an early example of a rectilinear street with a regular succession of uniform elements on the facades.
- The bridge was often employed for official ceremonies.


Perspective - Pont Notre-Dame


Elevation - Pont Notre-Dame



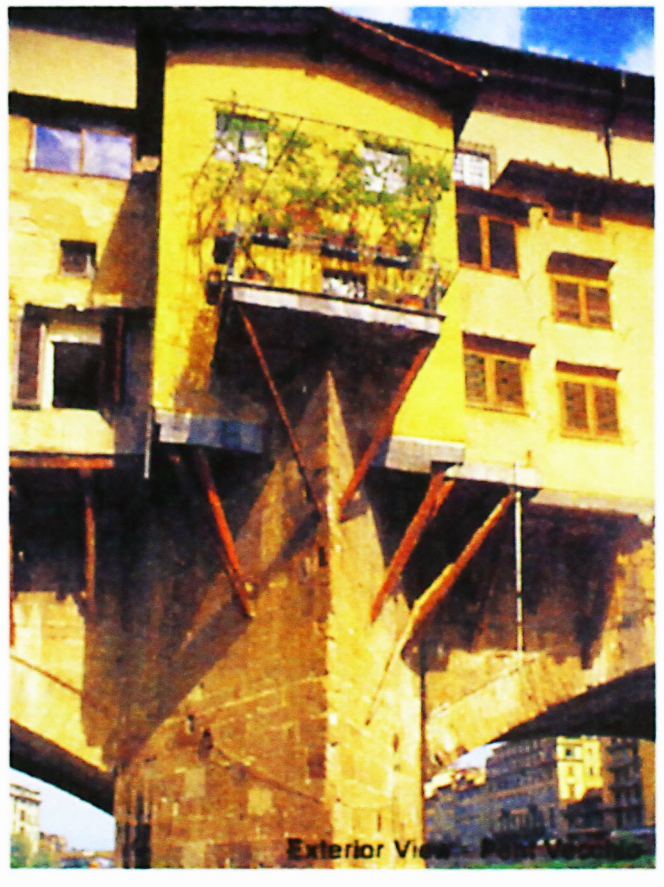
Section - Pont Notre Dame

The Pont Vecchio, Florence, 1345

Major Characteristics:
- The bridge supported a church, the homes and towers of the Mannelli family, a vegetable market and 43 shops occupied by a variety of tradesmen, from butchers, grocers to blacksmiths.
- The shops had been redocorated and additions were built over the river.


View of the Pont Vecchio, 1742


View of the Pont Vecchio, Mid-17th Century


Exterior View - Pont Vecchio


Perspective - Pont Vecchio

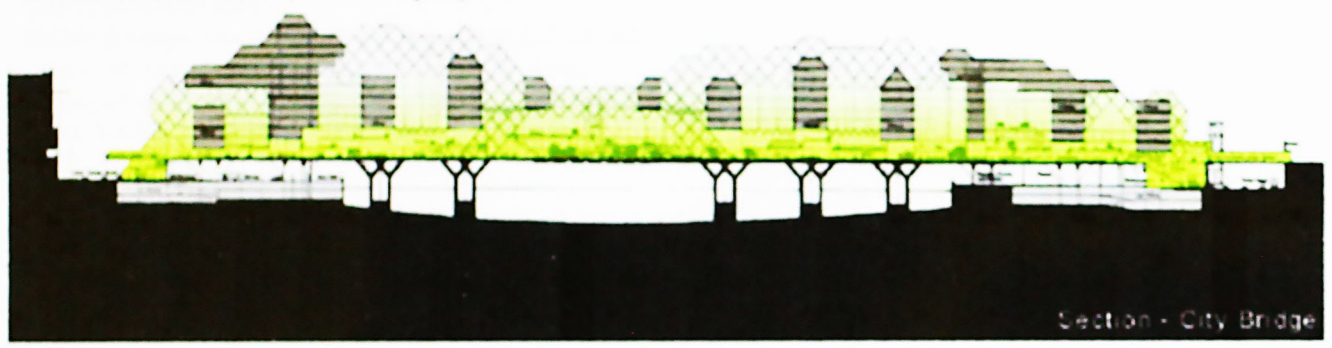
Precedent Study - Inhabited Bridge - Mid-20th Century

A City Bridge, London 1980
by R. Seifert and Partners

"The fundamental design principle is that the bridge should not purely be seen as a method of public transportation, but as a raised street full of fascinating and various attractions which will enrich the life of London and draw people to the Thames ", Seifert

Major characteristics:
- The City Bridge provided a direct and amenable pedestrian link for 30,000 people from the City to London Bridge Station.
- The bridge is a megastructure that contains a variety of public facilities, shops, offices, residential accomodation, and a city square.

Location Plan - City Bridge



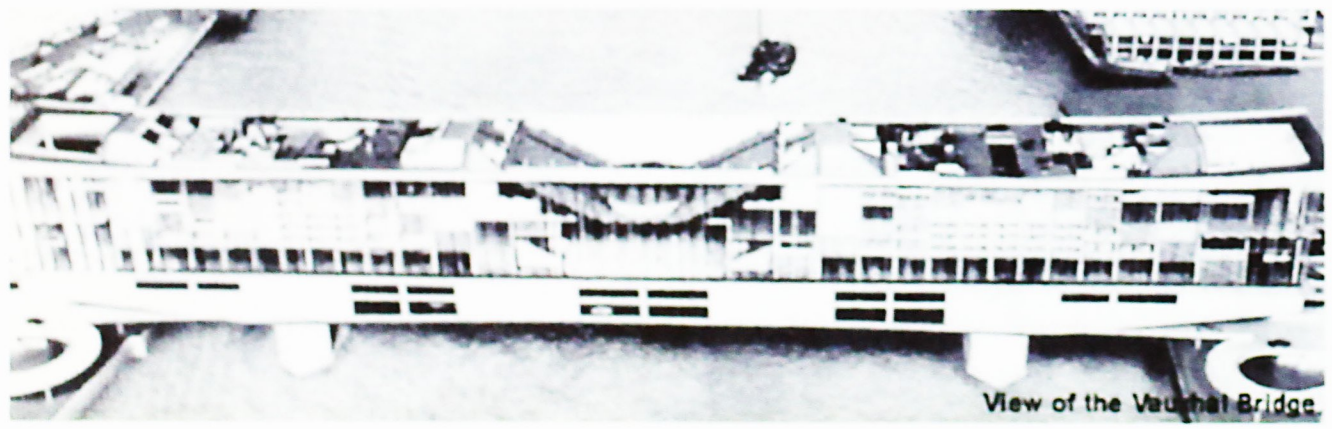
Section - City Bridge

Plan - City Bridge

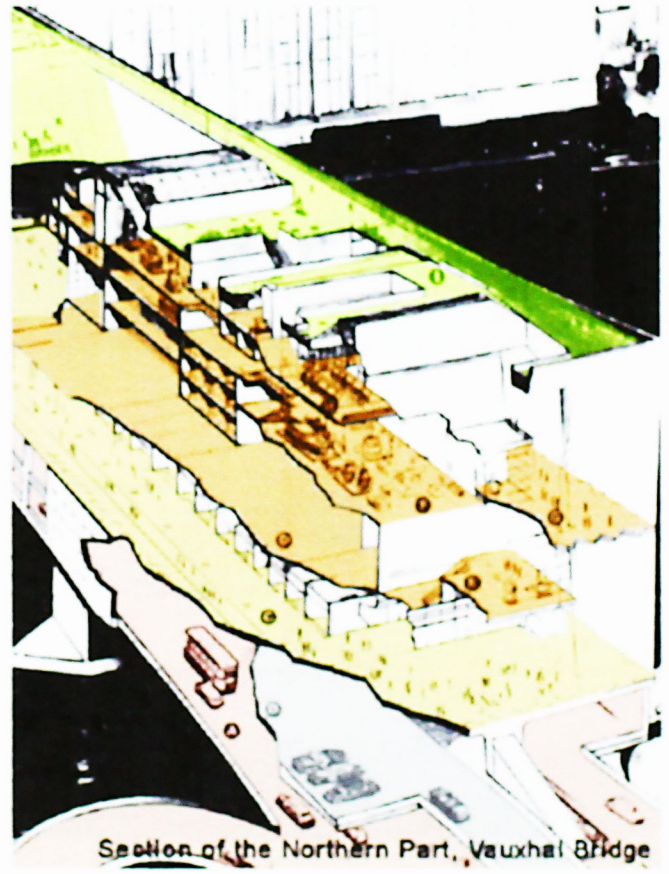
Vauxhal Bridge, London 1963
by Jellicoe and Coleridge

Major Characteristics
- The project was comissioned to investigate and promote the use of glass in buildings
- The bridge is an air-conditioned glass box supported by two piers in the river and overhangs the banks at either ends
- The length of the bridge is 298.5m, the width 38.7m, and its heigt 50.7 above high water. It provides 89, 230m sq. covered floor space
- The bridge was designed for civil and commercial use.

Viewing Platform
Sculpture Gallery
Shopping Arcade
Sevice Road with Parking
The main roadway



View of the Vauxhal Bridge



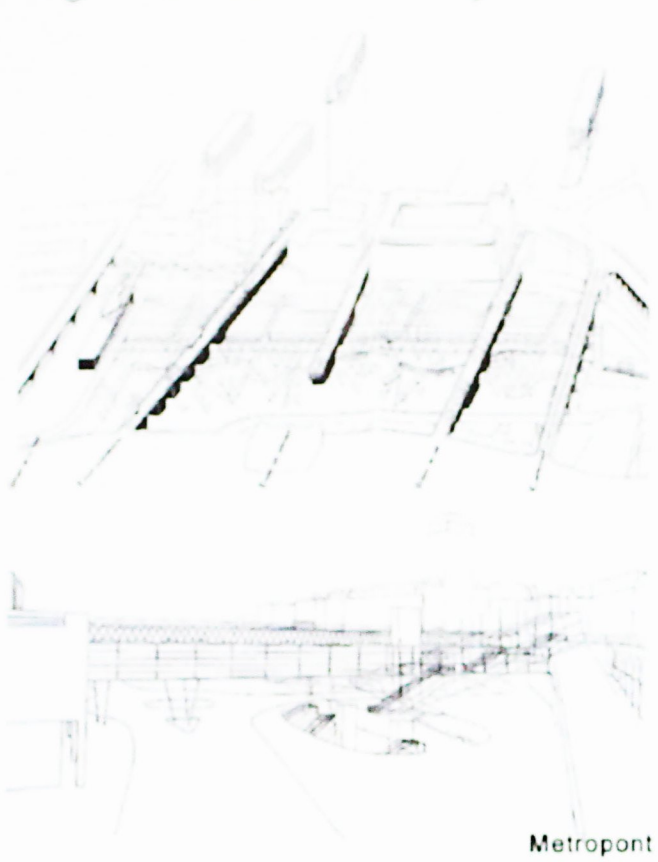
Section of the Northern Part, Vauxhal Bridge

View of Open Air Theatre, Vauxhal Bridge

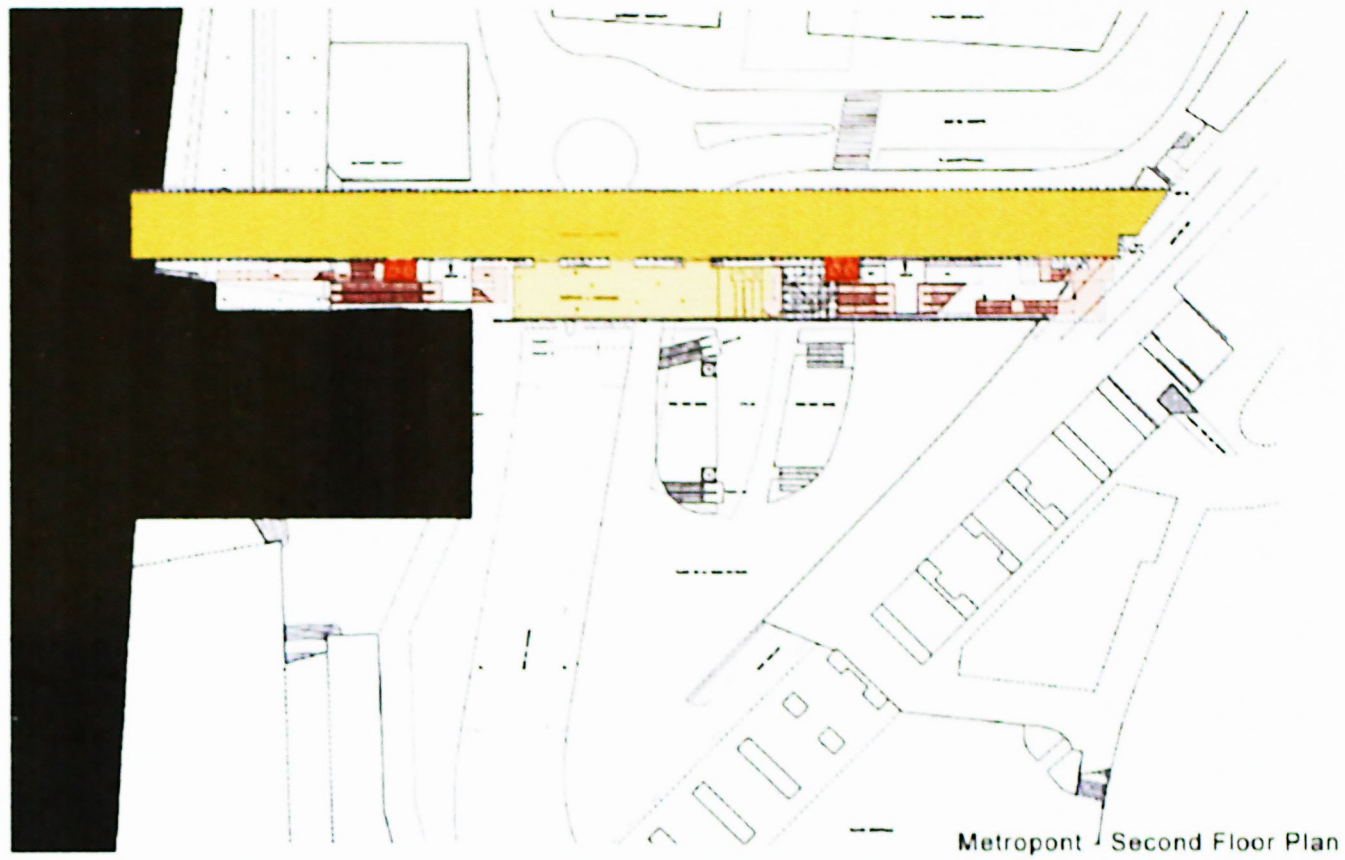
Precedent Study - Inhabited Bridge - Lausanne Project 1988, Bernard Tschumi

"The individual programs applied to each of the four bridges then give each a specific character, allowing the inhabited bridge to function as an urban generator. The concept of urban generator not only allows now spatial links with the existing city but encourage unpredictable programmatic factors, new urban events that will appear in coming decades.", Bernard Tschumi.

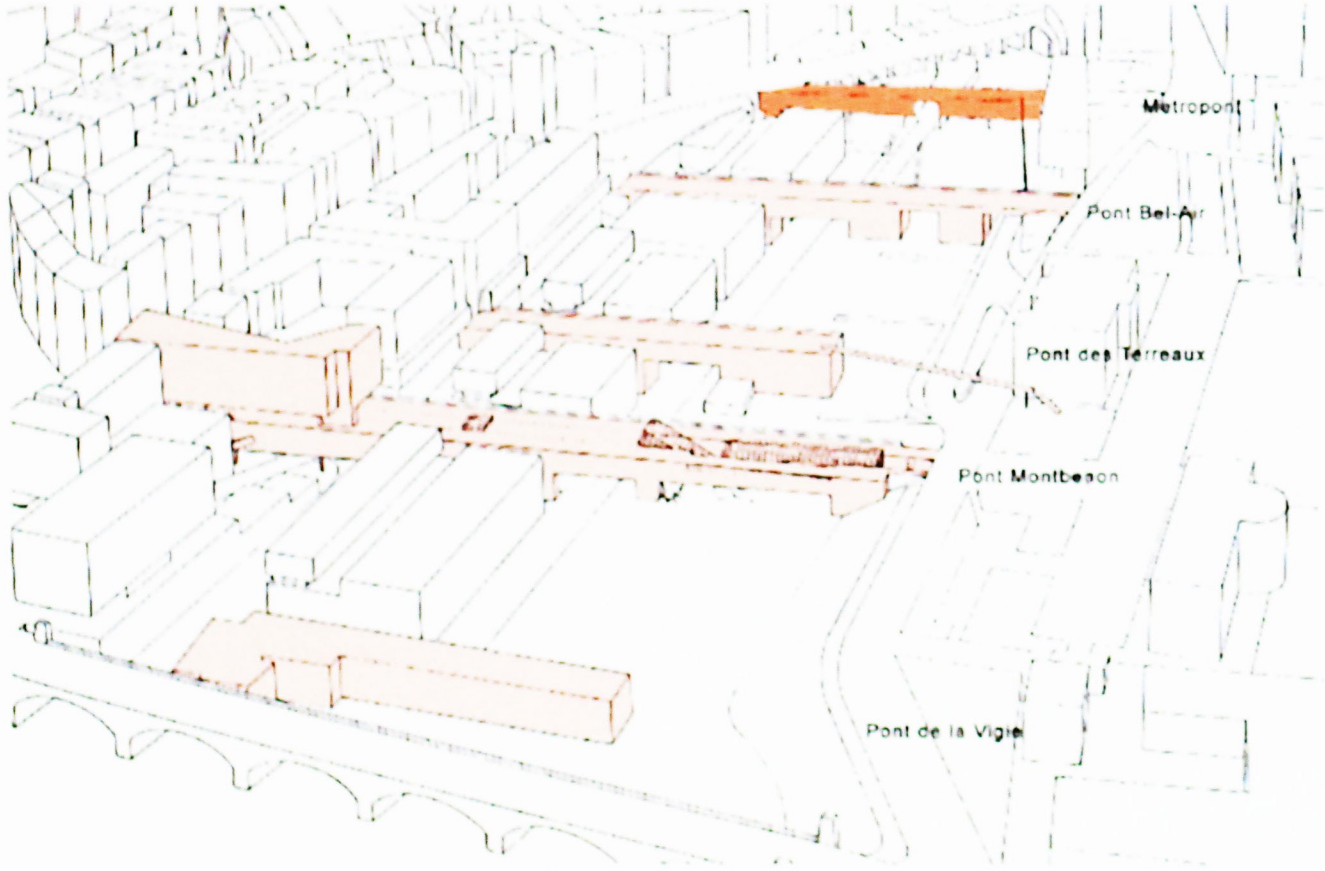
Major characteristics:
- The inhabited bridges are both horizontal and vertical connectors, as their ramps, escalators and elevators link the lower levels of the valley to the upper levels of the historical city.
- Each bridge accomodates two categories of uses: in the core element, public or commercial use, and at the deck level, pedestrian traffic and related uses.



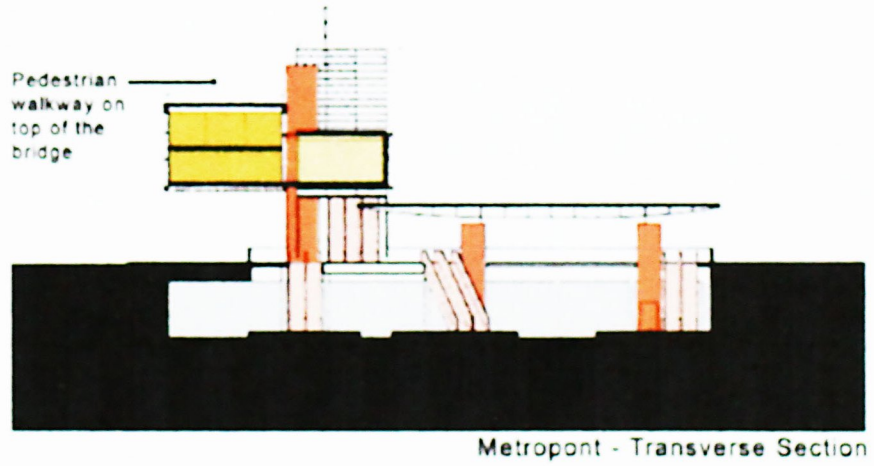
Metropont



Metropont - Second Floor Plan



Metropont - Longitudinal Section



Metropont - Transverse Section

Commercial Offices
Cafe
Vertical Circulation
Metro Station

III. Design – Reweaving the New & Old Urban Fabrics

This thesis explores how the design of an area or buildings can relate to the flyovers cutting through or next to them, so that a new relationship between the urban environment and flyovers is built up.
A typology is established according to the different relationships between the flyovers and the urban fabrics. Six types of relationships are identified and each type is associated with one main issue. One of these types is chosen for further study and that type is "the flyover between the new and old urban fabrics".

Major Issues

- the flyover act as a visual and physical "edge" between the two different fabrics
- several streets in the old urban fabric stop in front of the flyover
- poor connectivity
- there are many leftover space around and under the flyover
- thousands of people have to cross this edge every day
- unpleasant crossing experience

Examples:
1. Mong Kok – West Kowloon Corridor
2. Sham Shui Po – West Kowloon Corridor
3. Sai Wan Ho – Island Eastern Corridor

- Sai Wan Ho is chosen as the site

Site Plan

The flyover passing through the new urban area on the left and the old urban area on the right in Sai Wan Ho

View from the new urban area to the old urban area

Site Plan


A tram depot under the flyover

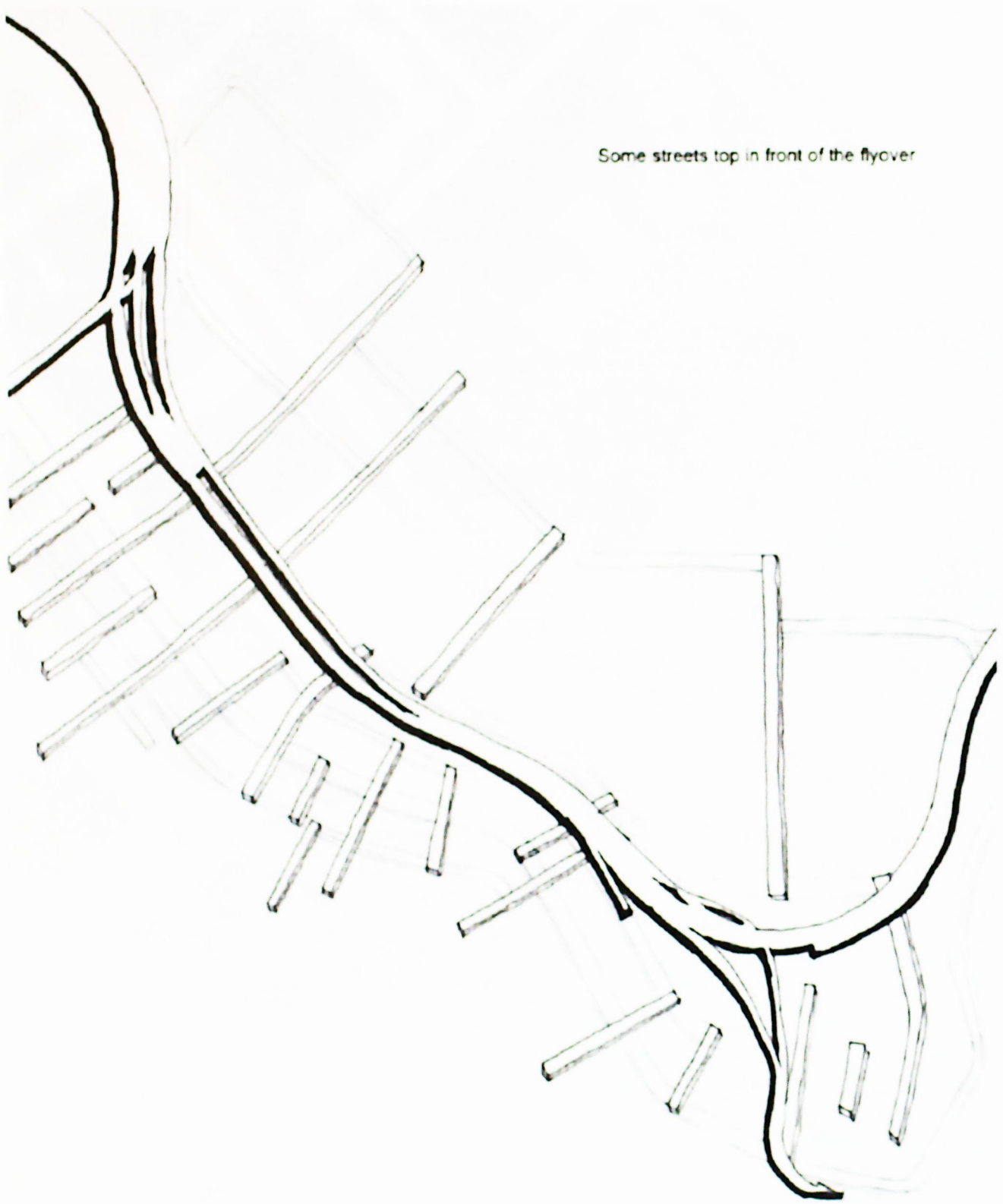

Temporary carpark near the flyover


A park under the flyover


Leftover space under the flyover

Unpleasant crossing experience

Many leftover space around & under the flyover



Some streets top in front of the flyover

Large area of leftover space around the flyover

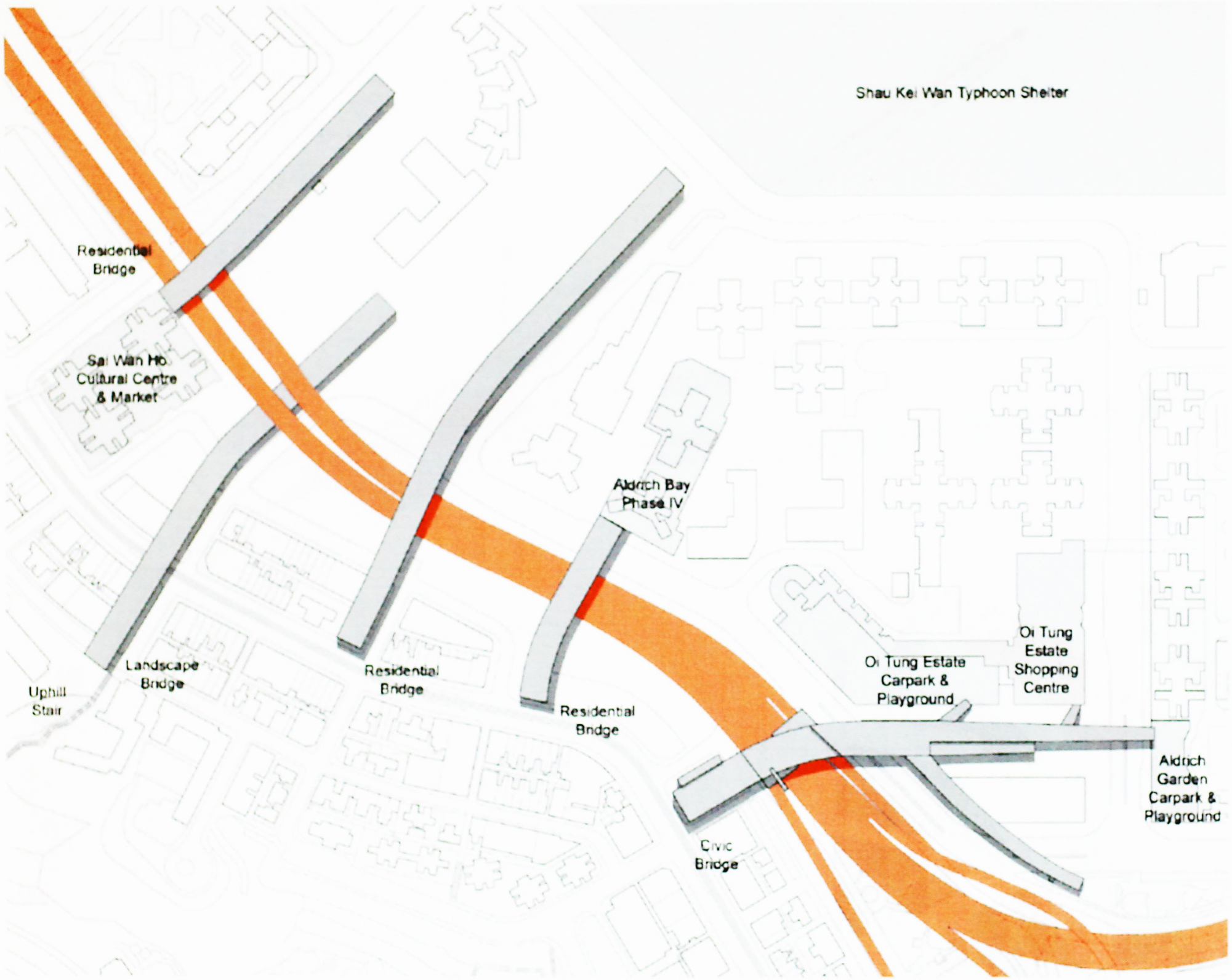
Diagrams

New urban area

Old urban area

Figure Ground Diagram (Before Intervention)

Figure Ground Diagram (After Intervention)



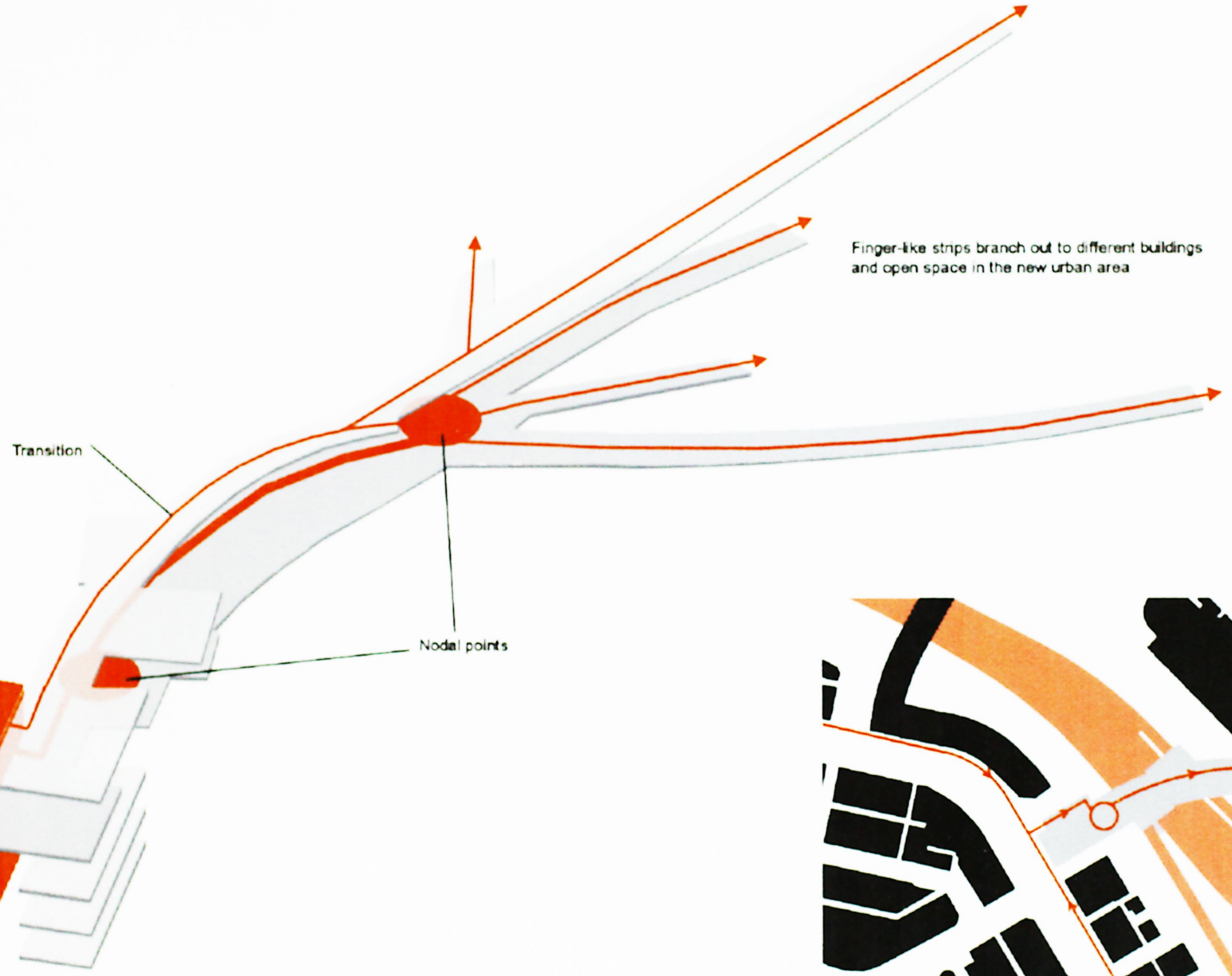
Site Plan with Habitable Bridges

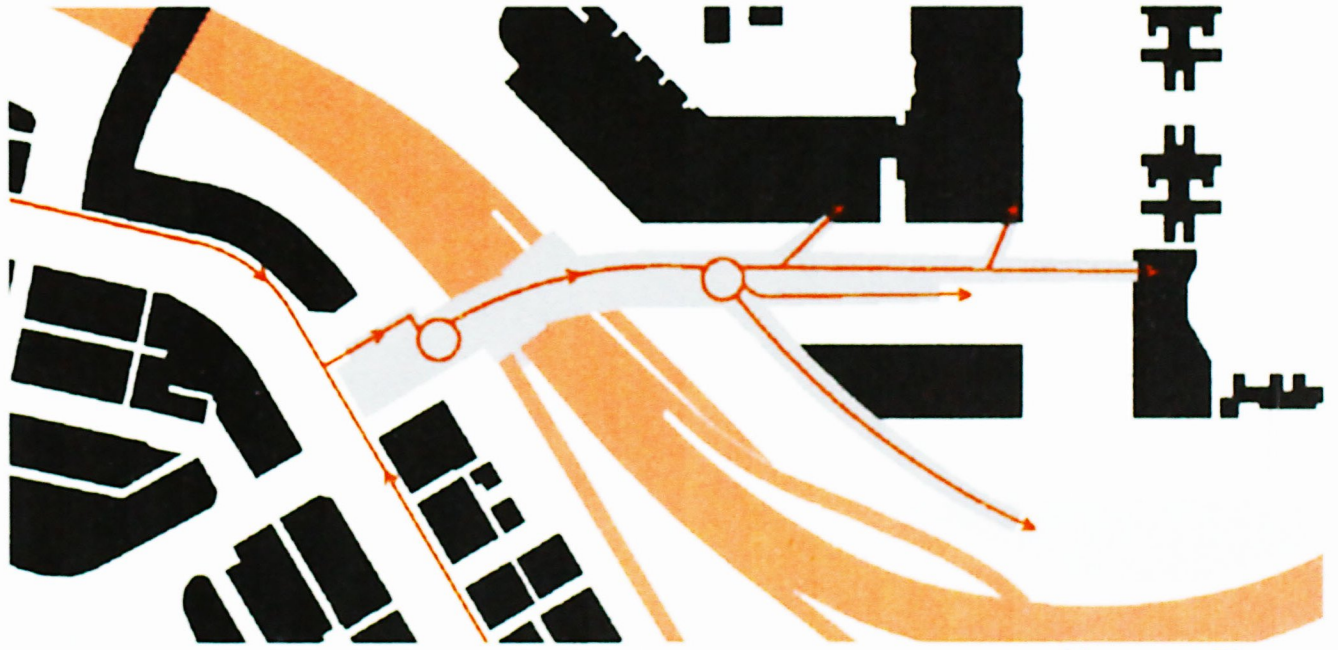
- reweaving the two districts by a series of habitable bridges
- these bridges continue the streets on the ground level & connects the buildings in the two areas on the upper level
- these bridges are public infrastructure that serve the community nearby
- five bridges
  1. three residential bridges: platform connects the residential buildings on 2 sides

  2. one recreational bridge: landscape deck with undulating terrain connects the hill and the water-front

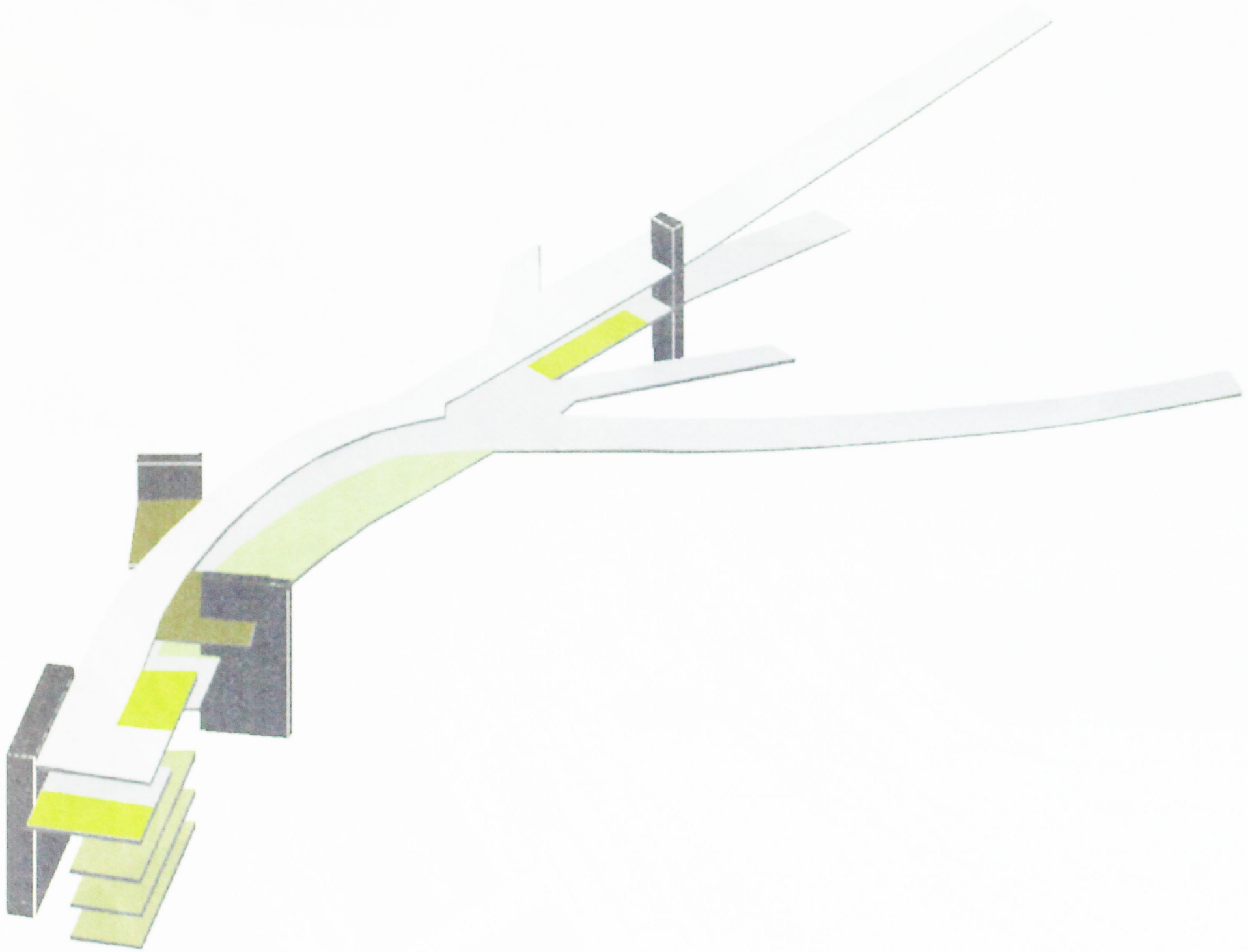
  3. one civic bridge: an enclosed bridge with public space and functions connects the shopping centre and public buildings in the new area and the old area

- the leftover space under and along the flyover is also fitted with structures of public facilities





Movement Diagram



Exhibition Space

Community Centre

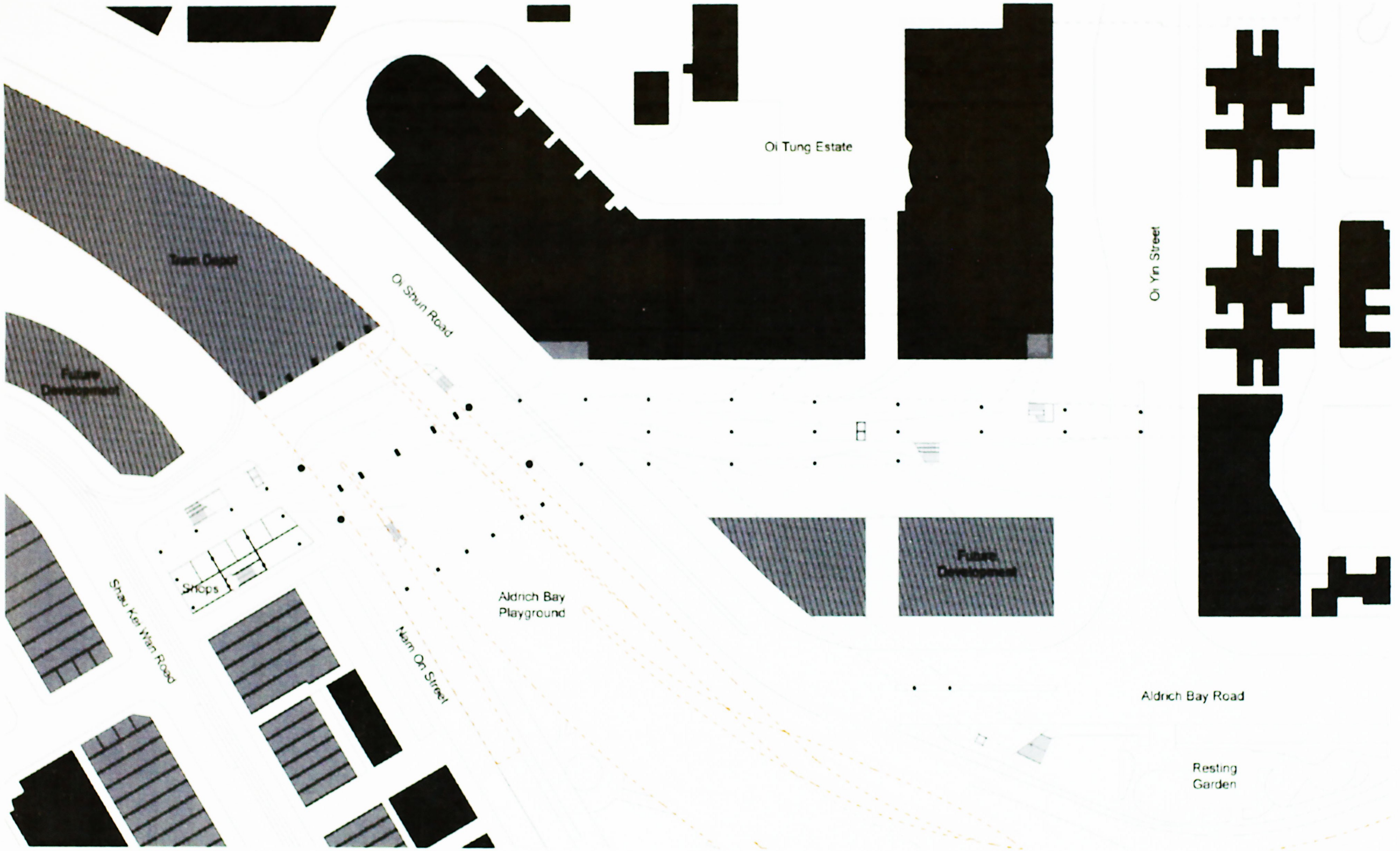
Cafe

Library

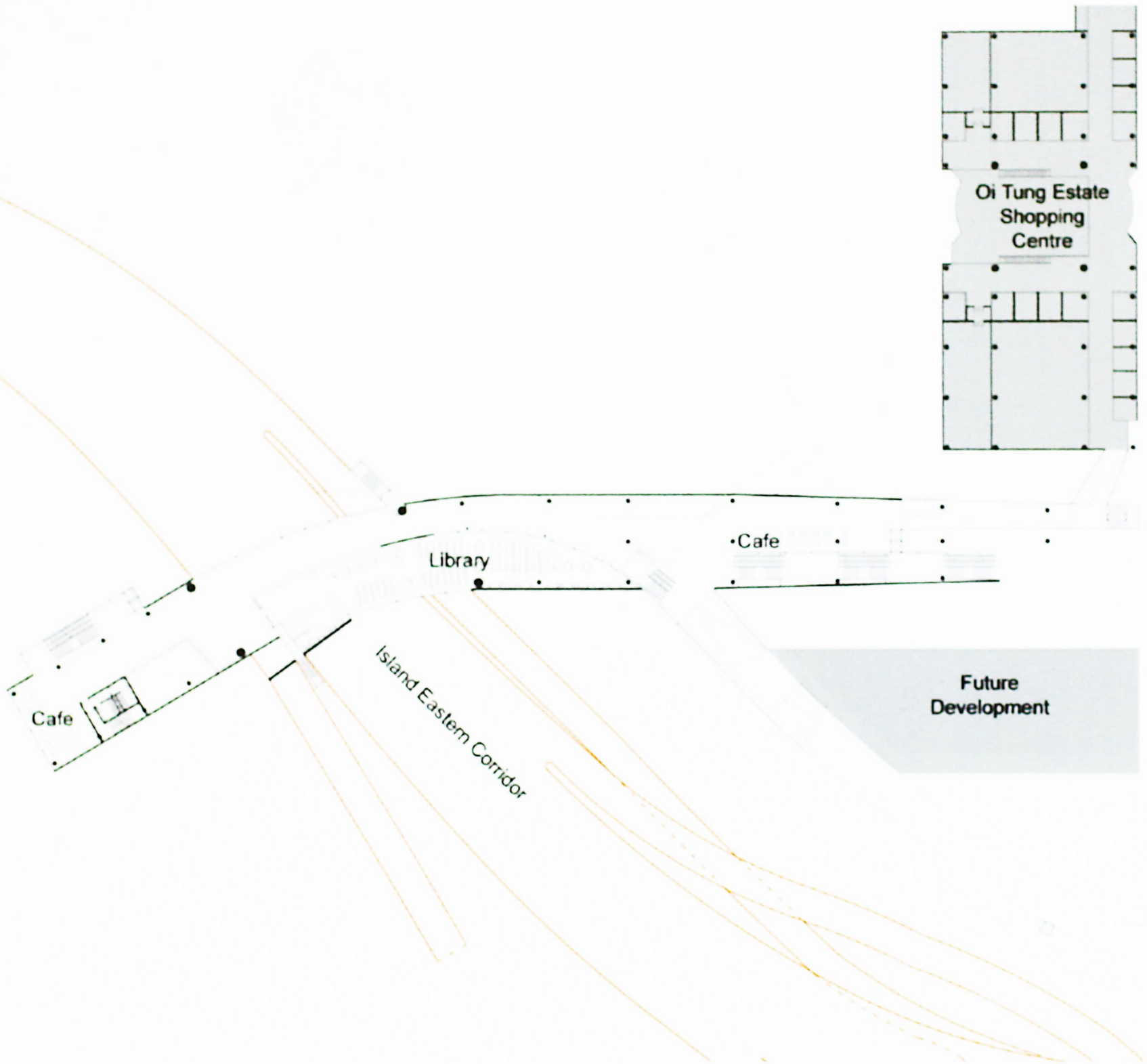
Vertical Circulation

Horizontal Circulation

Functional Diagram



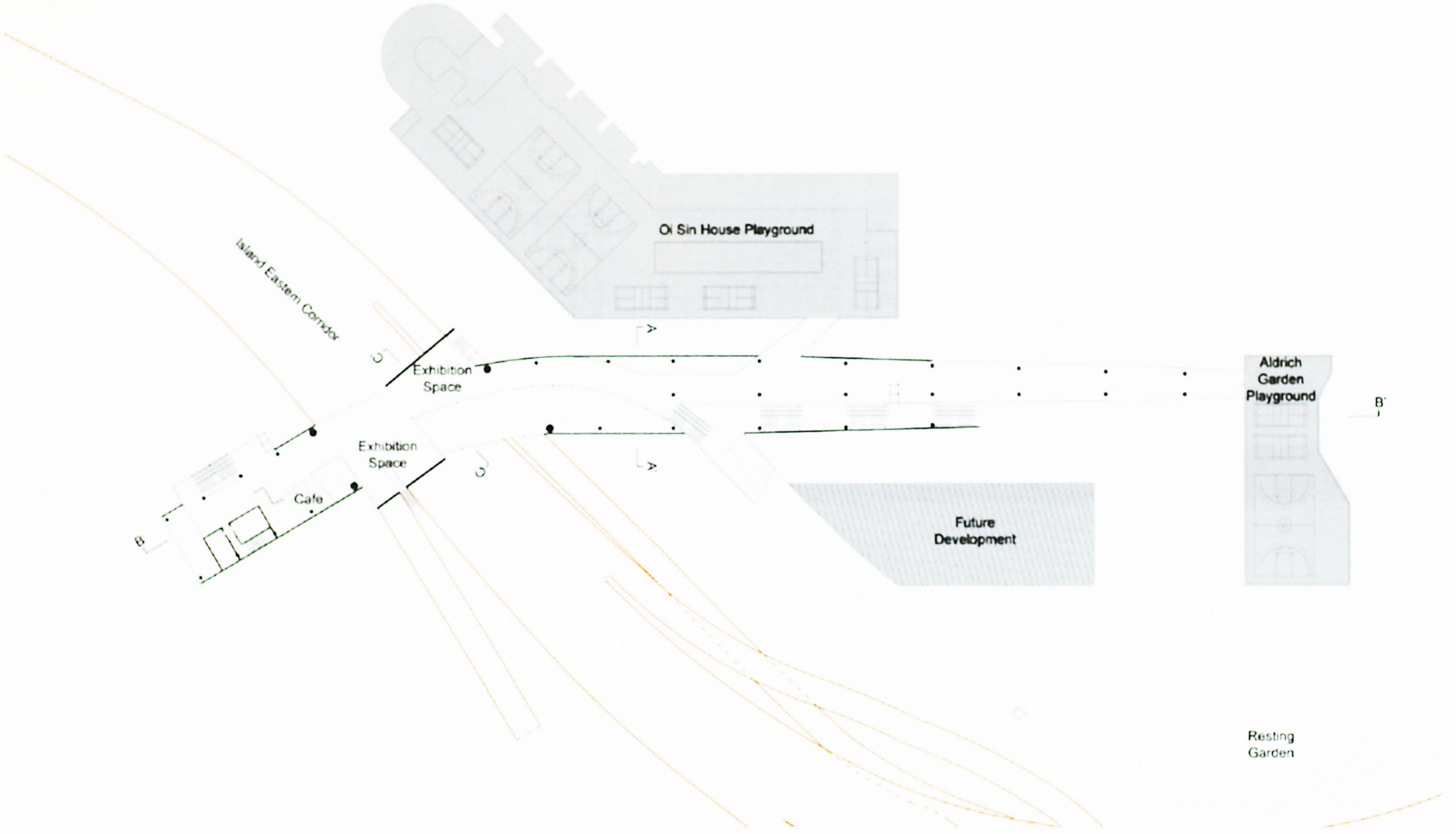
Ground Floor Plan



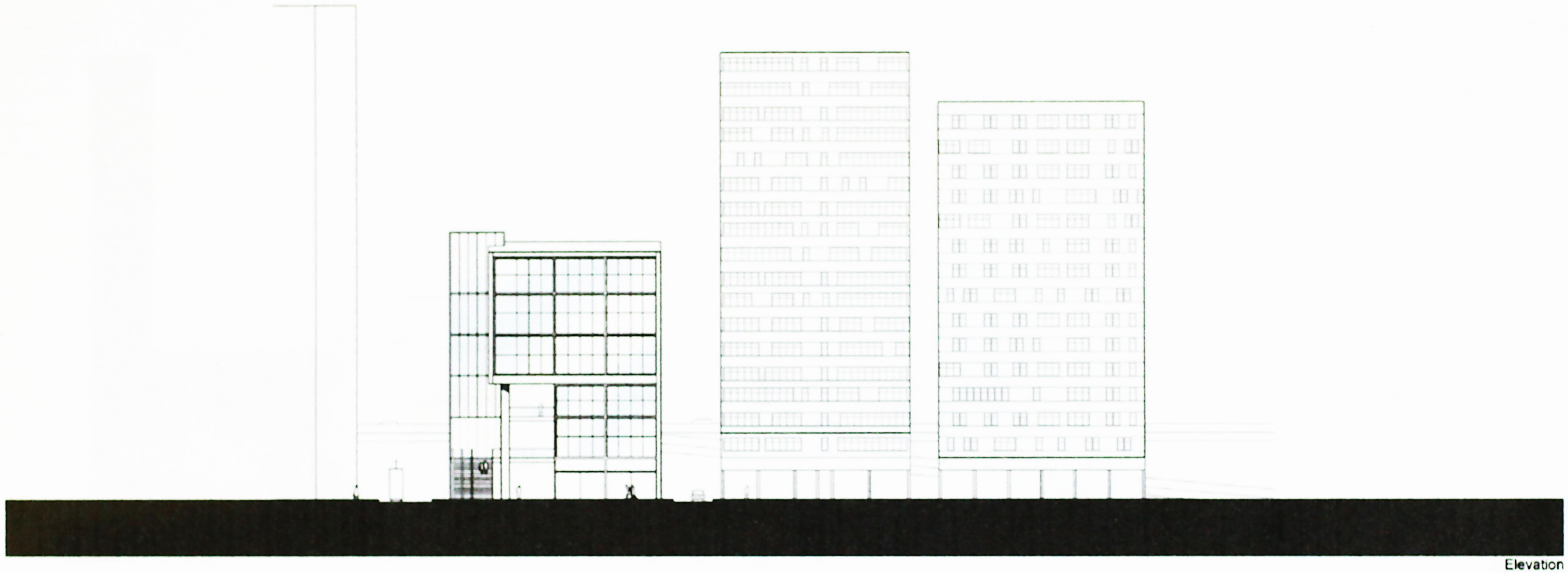
Third Floor Plan

Second Floor Plan

First Floor Plan

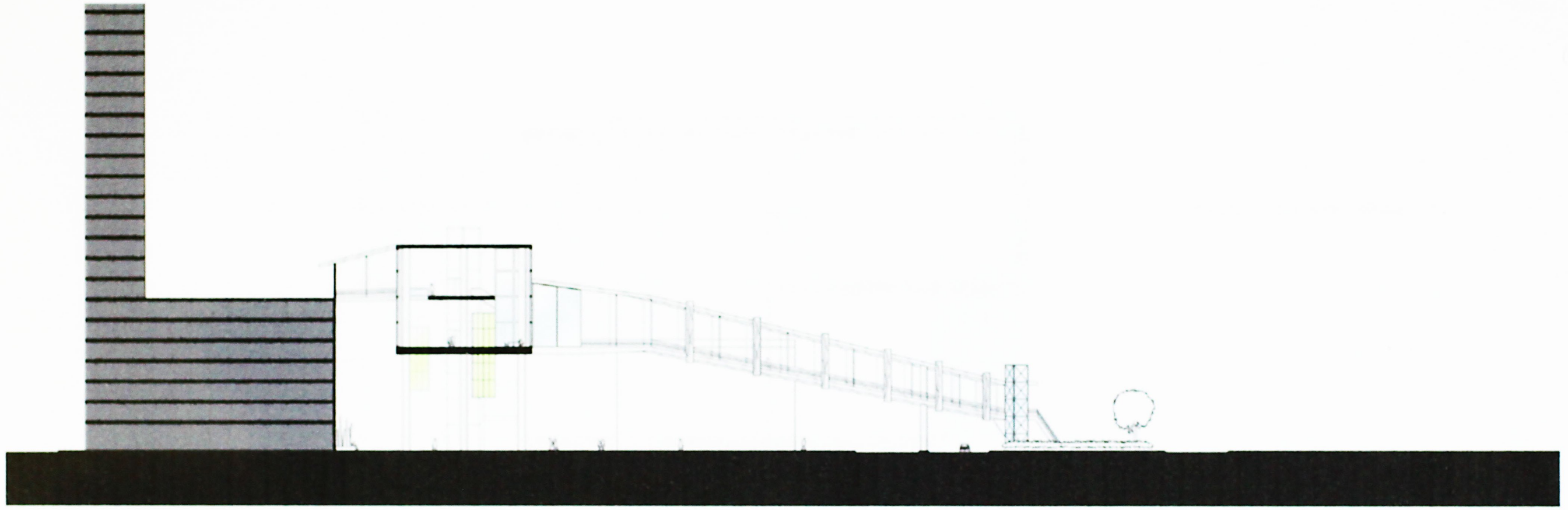


Forth Floor Plan

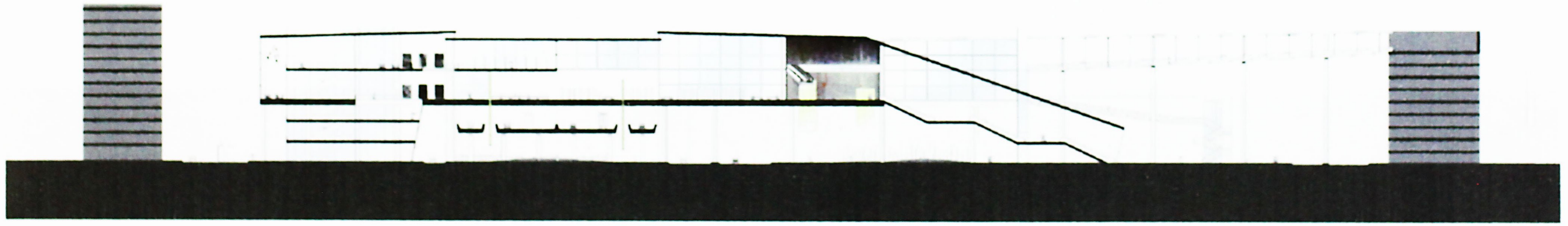


Elevation

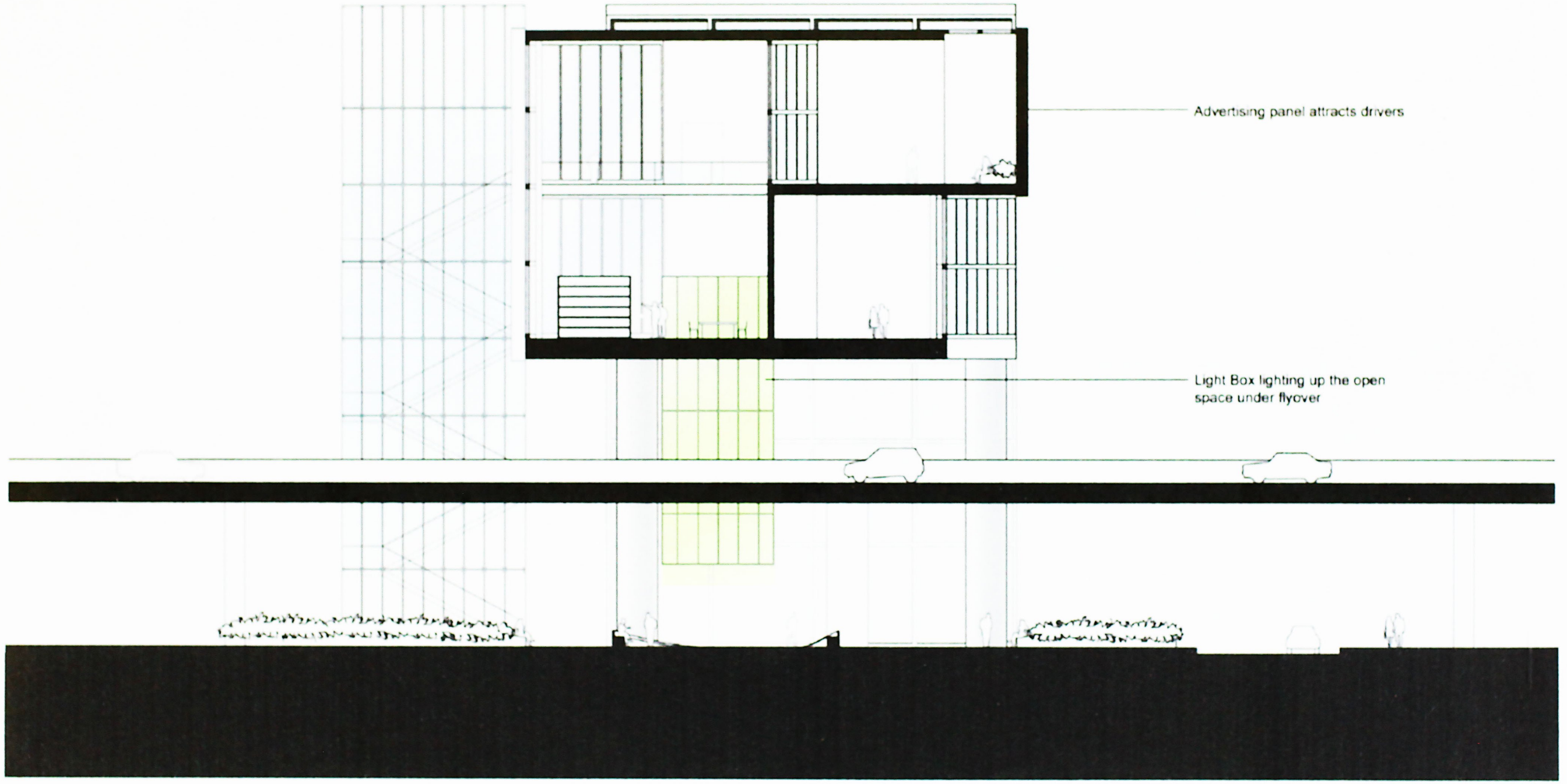
Elevation



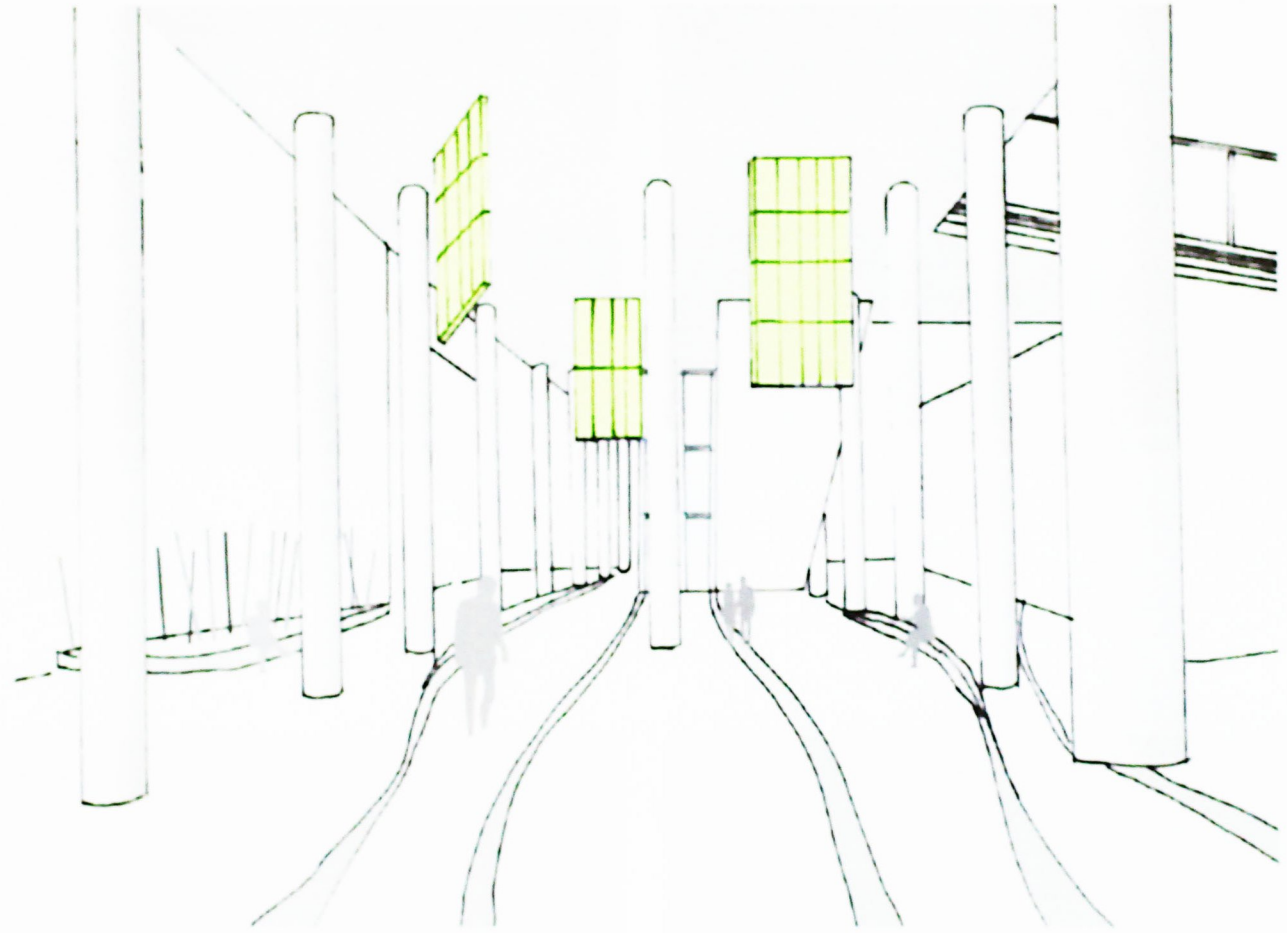
Section A-A

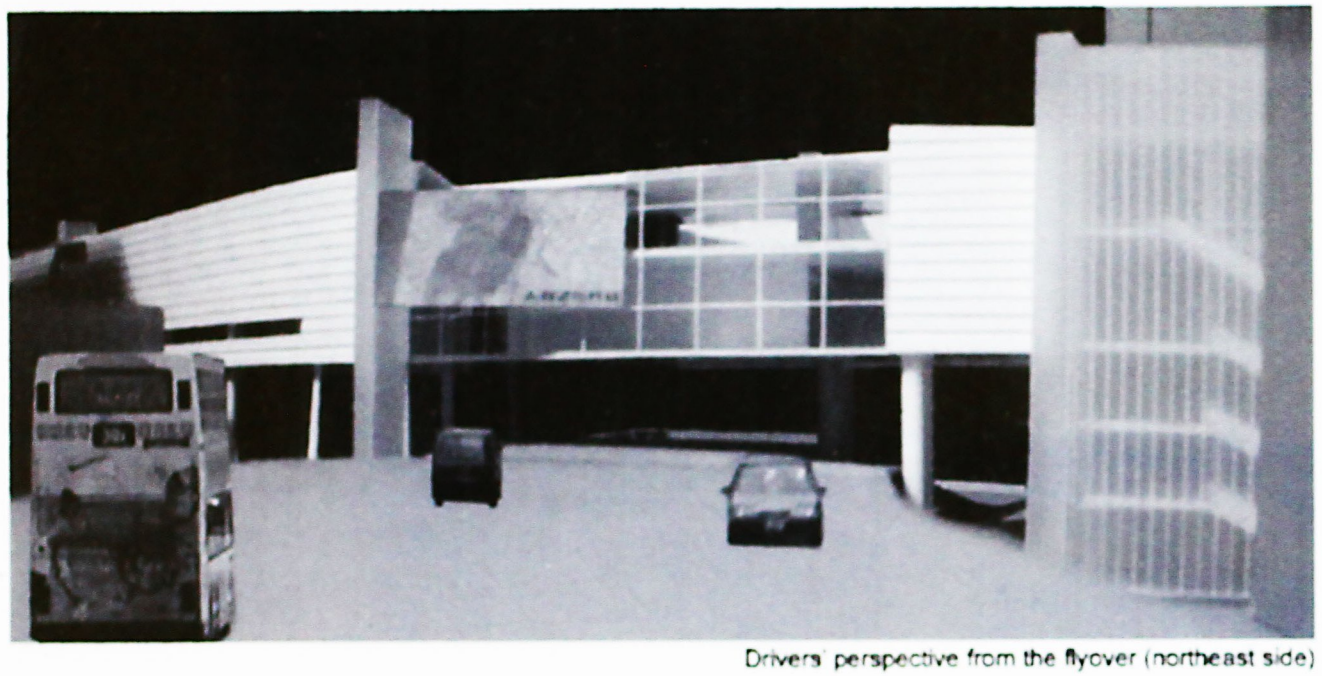


Section B-B


Advertising panel attracts drivers
Light Box lighting up the open space under flyover

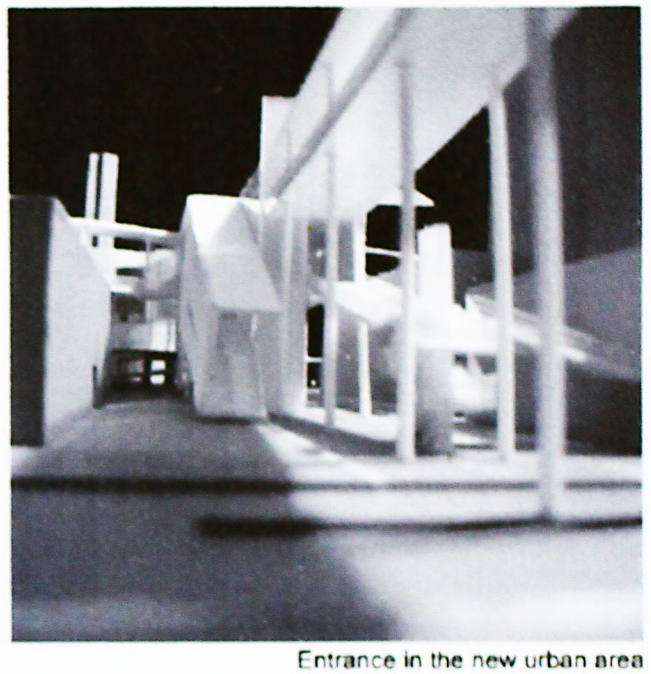
Section C-C'



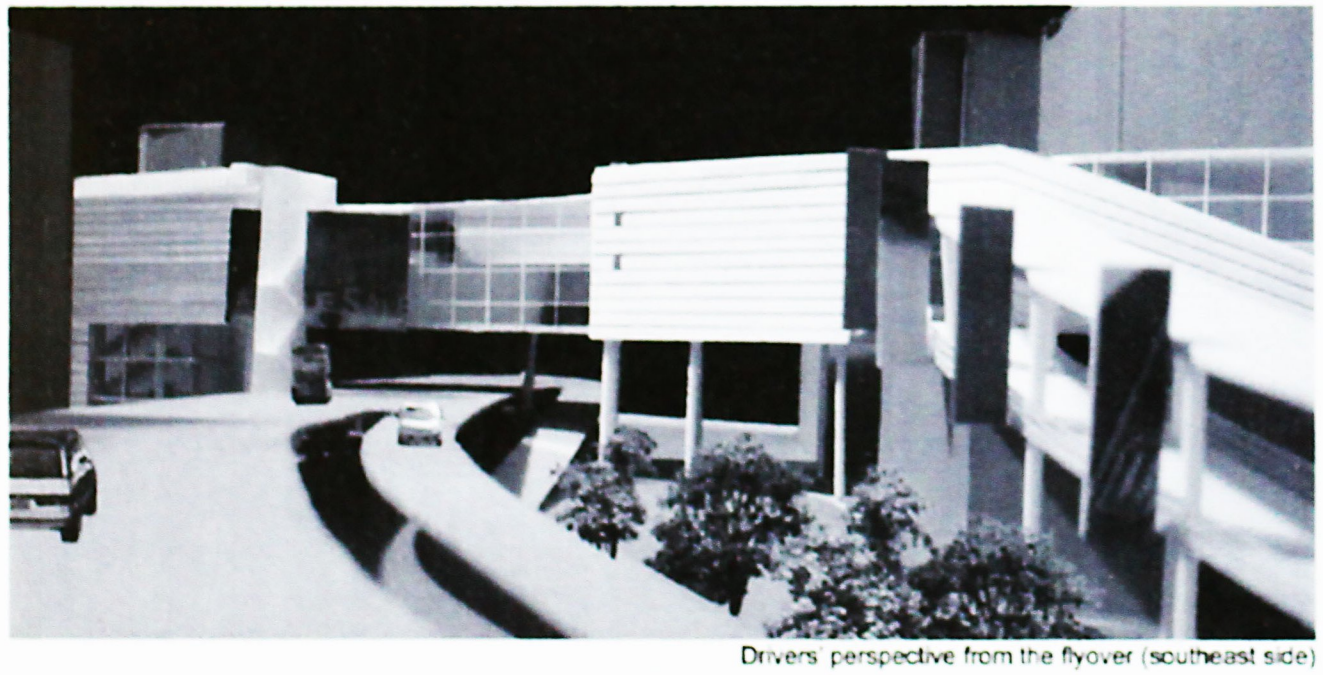


Drivers' perspective from the flyover (northeast side)

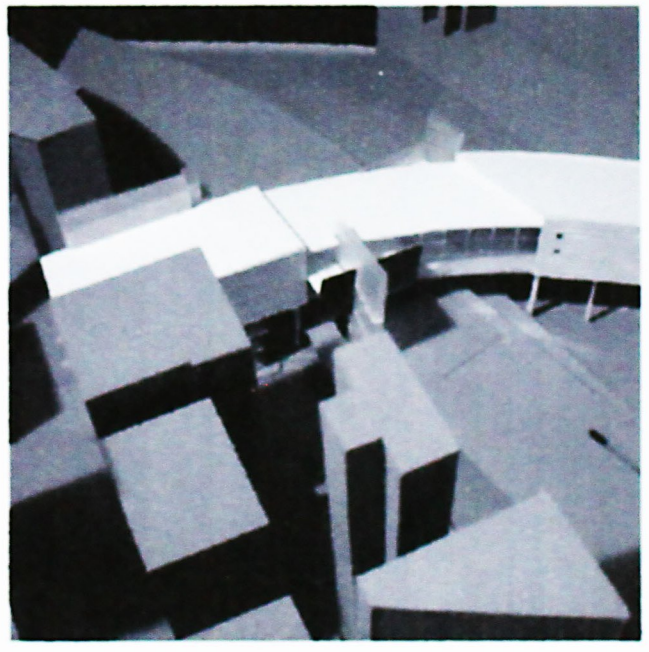
Entrance in the old urban area

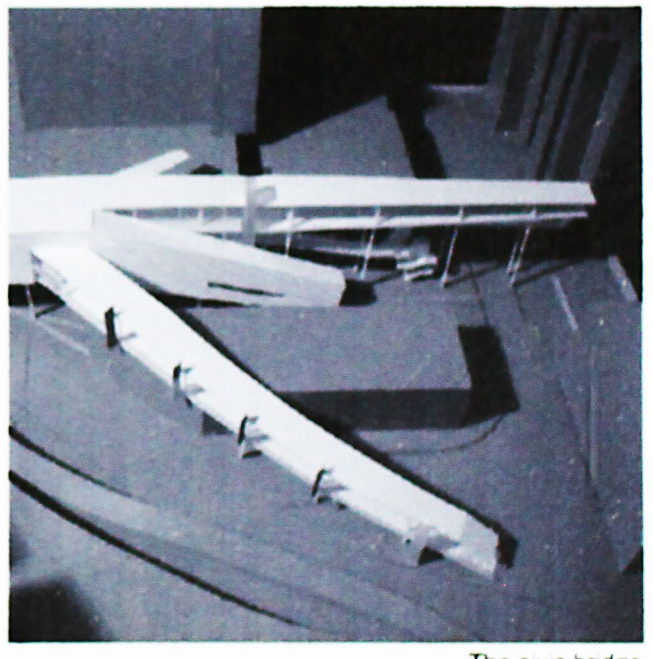


Entrance in the new urban area



Drivers' perspective from the flyover (southeast side)





The civic bridge